### PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 NPL Characteristics Data Collection Form UNC-San Mateo Mine - 11/29/95

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#### Record Information

- 1. Site Name: UNC-San Mateo Mine (as entered in CERCLIS)
- 2. Site CERCLIS Number: NM1223075515
- 3. Site Reviewer: Peter M. Rung
- 4. Date: 10/2/95
- 5. Site Location: San Mateo, Cibola County, Texas (City/County, State)
- 6. Congressional District:
- 7. Site Coordinates: Multiple

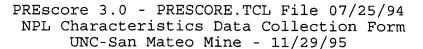
Latitude: 35 19'41.5"

Longitude: 107 43'13.0"

## Site Description

- 1. Setting: Rural
- 2. Current Owner: Federal
- 3. Current Site Status: Inactive
- 4. Years of Operation: Inactive Site, from and to dates: 1957-1984
- 5. How Initially Identified: Unknown
- 6. Entity Responsible for Waste Generation:
  - Mining
    - Metals
- 7. Site Activities/Waste Deposition:
  - Surface Impoundment
  - Waste Piles





### Waste Description

- 8. Wastes Deposited or Detected Onsite:
  - Mining Waste
  - Radioactive Waste

### Response Actions

9. Response/Removal Actions:

#### RCRA Information

- 10. For All Active Facilities, RCRA Site Status:
  - Not Applicable

### Demographic Information

- 11. Workers Present Onsite: No
- 12. Distance to Nearest Non-Worker Individual: > 1 Mile
- 13. Residential Population Within 1 Mile: No
- 14. Residential Population Within 4 Miles: 0.0

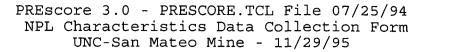
#### Water Use Information

- 15. Local Drinking Water Supply Source:
  - Ground Water (within 4 mile distance limit)
- 16. Total Population Served by Local Drinking Water Supply Source:
- 17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:
  - Private

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18. Surface Water Adjacent to/Draining Site:

- Other - EPHEMERAL ARROYO

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## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 HRS DOCUMENTATION RECORD UNC-San Mateo Mine - 11/29/95

1. Site Name: UNC-San Mateo Mine (as entered in CERCLIS)

2. Site CERCLIS Number: NM1223075515

3. Site Reviewer: Peter M. Rung

4. Date: 10/2/95

5. Site Location: San Mateo, Cibola County, Texas (City/County, State)

6. Congressional District:

7. Site Coordinates: Multiple

Latitude: 35 19'41.5" Longitude: 107 43'13.0"

	Score
Ground Water Migration Pathway Score (Sgw)	1.61
Surface Water Migration Pathway Score (Ssw)	3.33
Soil Exposure Pathway Score (Ss)	1.07
Air Migration Pathway Score (Sa)	0.00
Site Score	1.93

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

## PREscore 3.0 - PRESCORE.TCL File 07/25/94 GROUND WATER MIGRATION PATHWAY SCORESHEET UNC-San Mateo Mine - 11/29/95

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: Alluvial Aquifer		
1. Observed Release	550	0
2. Potential to Release 2a. Containment 2b. Net Precipitation 2c. Depth to Aquifer 2d. Travel Time 2e. Potential to Release [lines 2a(2b+2c+2d)] 3. Likelihood of Release	10 10 5 35 500 550	10 1 5 35 410 410
Waste Characteristics		
4. Toxicity/Mobility 5. Hazardous Waste Quantity 6. Waste Characteristics	* * 100	1.00E+02 10000 32
Targets		
7. Nearest Well 8. Population	50	5.00E+00
8a. Level I Concentrations 8b. Level II Concentrations 8c. Potential Contamination 8d. Population (lines 8a+8b+8c) 9. Resources 10. Wellhead Protection Area 11. Targets (lines 7+8d+9+10) 12. Targets (including overlaying aquifers) 13. Aquifer Score	** ** 5 20 ** 100	0.00E+00 0.00E+00 1.20E-01 1.20E-01 5.00E+00 0.00E+00 1.01E+01 1.01E+01
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	1.61

<sup>\*</sup> Maximum value applies to waste characteristics category.
\*\* Maximum value not applicable.

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET UNC-San Mateo Mine - 11/29/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release by Overland Flow 2a. Containment 2b. Runoff 2c. Distance to Surface Water 2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	10 25 25 500	10 1 20 210
3. Potential to Release by Flood 3a. Containment (Flood) 3b. Flood Frequency 3c. Potential to Release by Flood (lines 3a x 3b)	10 50 500	. 0 0 0
4. Potential to Release (lines 2d+3c) 5. Likelihood of Release	500 550	210 550
Waste Characteristics		
6. Toxicity/Persistence 7. Hazardous Waste Quantity 8. Waste Characteristics	* * 100	1.00E+04 10000 100
Targets		
9. Nearest Intake 10. Population	50	0.00E+00
10. Population 10a. Level I Concentrations 10b. Level II Concentrations 10c. Potential Contamination 10d. Population (lines 10a+10b+10c) 11. Resources 12. Targets (lines 9+10d+11)	** ** ** 5 **	0.00E+00 0.00E+00 0.00E+00 0.00E+00 5.00E+00 5.00E+00
13. DRINKING WATER THREAT SCORE	100	3.33

<sup>\*</sup> Maximum value applies to waste characteristics category.
\*\* Maximum value not applicable.

## PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET UNC-San Mateo Mine - 11/29/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation 16. Hazardous Waste Quantity 17. Waste Characteristics	* * 1000	5.00E+07 10000 560
Targets		
18. Food Chain Individual 19. Population	50	0.00E+00
19a. Level I Concentrations 19b. Level II Concentrations 19c. Pot. Human Food Chain Contamination 19d. Population (lines 19a+19b+19c) 20. Targets (lines 18+19d)	** ** ** **	0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.00

<sup>\*</sup> Maximum value applies to waste characteristics category.
\*\* Maximum value not applicable.

# PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 5 SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET UNC-San Mateo Mine - 11/29/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc. 24. Hazardous Waste Quantity 25. Waste Characteristics	* * 1000	5.00E+06 10000 320
Targets		
26. Sensitive Environments 26a. Level I Concentrations 26b. Level II Concentrations 26c. Potential Contamination 26d. Sensitive Environments (lines 26a+26b+26c) 27. Targets (line 26d)	** ** ** **	0.00E+00 0.00E+00 0.00E+00 0.00E+00
28. ENVIRONMENTAL THREAT SCORE	60	0.00
29. WATERSHED SCORE	100	3.33
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	3.33

<sup>\*</sup> Maximum value applies to waste characteristics category.
\*\* Maximum value not applicable.

PAGE:

## PREscore 3.0 - PRESCORE.TCL File 07/25/94 SOIL EXPOSURE PATHWAY SCORESHEET UNC-San Mateo Mine - 11/29/95

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity 3. Hazardous Waste Quantity 4. Waste Characteristics	* * 100	1.00E+04 100 32
Targets		
5. Resident Individual 6. Resident Population	50	0.00E+00
<ul> <li>6a. Level I Concentrations</li> <li>6b. Level II Concentrations</li> <li>6c. Resident Population (lines 6a+6b)</li> <li>7. Workers</li> <li>8. Resources</li> <li>9. Terrestrial Sensitive Environments</li> <li>10. Targets (lines 5+6c+7+8+9)</li> </ul>	** ** 15 5 ***	0.00E+00 0.00E+00 0.00E+00 0.00E+00 5.00E+00 5.00E+00
11. RESIDENT POPULATION THREAT SCORE	**	8.80E+04

<sup>\*</sup> Maximum value applies to waste characteristics category.
\*\* Maximum value not applicable.
\*\*\* No specific maximum value applies, see HRS for details.

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## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 SOIL EXPOSURE PATHWAY SCORESHEET UNC-San Mateo Mine - 11/29/95

SOIL EXPOSURE PATHWAY Value Assigned Factor Categories & Factors Maximum Value NEARBY POPULATION THREAT \_\_\_\_\_\_ Likelihood of Exposure 12. Attractiveness/Accessibility 100 5.00E+01 1.00E+01 1.00E+02 3.75E+02 100 13. Area of Contamination 14. Likelihood of Exposure 500 3.75E+02 Waste Characteristics 15. Toxicity 1.00E+04 16. Hazardous Waste Quantity \* .100 100 32 17. Waste Characteristics Targets \_\_\_\_\_ 1 0.00E+00 \*\* 0.00E+00 \*\* 0.00E+00 18. Nearby Individual 19. Population Within 1 Mile \* \* 20. Targets (lines 18+19) \*\* 0.00E+00 21. NEARBY POPULATION THREAT SCORE 0.00E+00 \_\_\_\_\_\_ SOIL EXPOSURE PATHWAY SCORE (Ss) 100 | 1.07

<sup>\*</sup> Maximum value applies to waste characteristics category.

<sup>\*\*</sup> Maximum value not applicable.

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: AIR PATHWAY SCORESHEET UNC-San Mateo Mine - 11/29/95

AIR MIGRATION PATHWAY Value Assigned Factor Categories & Factors Maximum Value Likelihood of Release 1. Observed Release 550 2. Potential to Release 2a. Gas Potential to Release 500 0 2b. Particulate Potential to Release 500 0 2c. Potential to Release 500 0 3. Likelihood of Release 550 Waste Characteristics 4. Toxicity/Mobility 0.00E+00 5. Hazardous Waste Quantity 0 6. Waste Characteristics 100 7. Nearest Individual 50 0.00E+00 8. Population 8a. Level I Concentrations \* \* 0.00E+00 8b. Level II Concentrations \* \* 0.00E+00 8c. Potential Contamination \*\* 0.00E+00 8d. Population (lines 8a+8b+8c) \*\* 0.00E+00 9. Resources 5 0.00E+00 10. Sensitive Environments 10a. Actual Contamination \*\*\* 0.00E+00 10b. Potential Contamination \*\*\* 0.00E+00 10c. Sens. Environments(lines 10a+10b) \*\*\* 0.00E+00 11. Targets (lines 7+8d+9+10c) \*\* 0.00E+00

AIR MIGRATION PATHWAY SCORE (Sa)

<sup>\*</sup> Maximum value applies to waste characteristics category.

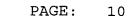
<sup>\*\*</sup> Maximum value not applicable.

<sup>\*\*\*</sup> No specific maximum value applies, see HRS for details.

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: WASTE QUANTITY
UNC-San Mateo Mine - 11/29/95

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: tailings pile

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00



## PREscore 3.0 - PRESCORE.TCL File 07/25/94 WASTE QUANTITY

UNC-San Mateo Mine - 11/29/95

### 2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	tailings pile
b. Source Type	Waste Pile
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal)   Source Area (ft2)	100000.00   0.00
e. Source Volume/Area Value	4.00E+04
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.00E+04

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Arsenic Barium Lead Selenium Uranium	< 2 < 2 < 2 < 2 < 2	NO NO NO NO NO	2.0E+01 5.0E+02 1.3E+01 1.4E+02 3.9E+02	ppm ppm ppm ppm
Vanadium	< 2	NO	7.2E+01	bbw

## Documentation for Source Type:

The tailings pile consists of waste rock disposed of in a series of spoils terraces. The rock consists mostly of barren shale and low grade mineralized rock. The pile is unreclaimed and has no vegatative cover.

Reference: 1, 2

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 WASTE QUANTITY UNC-San Mateo Mine - 11/29/95

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Documentation for Source Hazardous Substances:

Samples were collected by SAIC on June 30 and July 1, 1993 at the San Mateo site. Four soil samples were collected from the general mining and tailings area. However, because of relatively high radioactivity of the tailings pile measured during site screening, no samples of the pile itself were collected. The four soil samples were used to describe the tailings pile.

Reference: 1

Documentation for Source Volume:

Estimate is based on the 1994 SI by SAIC.

Reference: 1

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# PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 WASTE QUANTITY UNC-San Mateo Mine - 11/29/95

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: heap leach pile

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

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## PREscore 3.0 - PRESCORE.TCL File 07/25/94 WASTE QUANTITY

UNC-San Mateo Mine - 11/29/95

### 2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a.	Source ID	heap leach pile	
b.	Source Type	Land Treatment	
c.	Secondary Source Type	N.A.	
d.	Source Vol.(yd3/gal)   Source Area (ft2)	0.00	100000.00
e.	Source Volume/Area Value	3.70E+02	
f.	Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00	
g.	Data Complete?	NO	
h.	Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00	
i.	Data Complete?	NO	
k.	Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	3.70E+02	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Arsenic Barium Lead Selenium	< 2 < 2 < 2 < 2	NO NO NO	4.1E+00 2.3E+02 2.4E+01 2.2E+01	ppm ppm ppm
Uranium Vanadium	< 2 < 2	NO NO	2.3E+03 2.9E+02	ppm

### Documentation for Source Type:

The waste source is a heap leach pile. The pile is not lined and has no vegetative covering. Details of the leaching operation and chemicals used are unknown. The pile is reportedly dry and consists of waste rock from the mining operation.

Reference: 1, 2

## PREscore 3.0 - PRESCORE.TCL File 07/25/94 WASTE QUANTITY

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UNC-San Mateo Mine - 11/29/95

Documentation for Source Hazardous Substances:

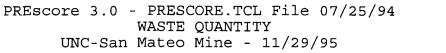
The samples were collected on June 30 and July 1, 1993 by SAIC at the San Mateo site. Analysis of the samples revealed significant concentrations of metals in the leach pile. Barium, lead, selenium, vanadium and uranium were found in concentrations greater than three times the background sample.

Reference: 1

Documentation for Source Area:

The estimation for the area of the heap leach pile comes from the 1994 SAIC SI report.

Reference: 1



## 3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No. Source ID		Vol. or Area Value (2e)		Hazardous Waste Qty. Value (2k)
1 tailings pile	GW-SW-SE	4.00E+04	0.00E+00	4.00E+04
2 heap leach pile	GW-SW-SE	3.70E+02	0.00E+00	3.70E+02

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## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 16 WASTE QUANTITY

UNC-San Mateo Mine - 11/29/95

### 4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Value	es	HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+02	10000	32
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	10000	100
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+07	10000	560
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+06	10000	320
SW: GW to SW, DW	Tox./Persistence	1.00E+02	10000	32
SW: GW to SW, HFC	Tox./Persis./Bioacc.	5.00E+04	10000	100
SW: GW to SW, Env	Etox./Persis./Bioacc.	5.00E+03	10000	56
Soil Exposure:Resident	Toxicity	1.00E+04	100	32
Soil Exposure: Nearby	Toxicity	1.00E+04	100	32
Air	Toxicity/Mobility	0.00E+00	0	0

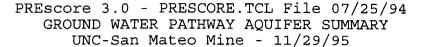
\* Hazardous Waste Quantity Factor Values

\*\* Waste Characteristics Factor Category Values

Note: SW = Surface Water

GW = Ground Water

DW = Drinking Water Threat HFC = Human Food Chain Threat Env = Environmental Threat



PAGE	:	1

No. Aquifer	ID	Туре	Overlaying No.	Inter- Connected with	Likelihood of Release	Targets
1 Alluvial	Aquifer	Non K	0	0	410	1.01E+01
Containment						

No.	Source ID	HWQ Value	Containment	Value
1 2	tailings pile heap leach pile	4.00E+04 3.70E+02	10 10	
===:	 Contai	======================================	<b>======</b> 10	=====

Documentation for Ground Water Containment, Source tailings pile:

Based on the 1993 SAIC sampling mission, there is evidence of the migration of hazardous metals from the tailings area. The area is unreclaimed and has no vegatative cover. The is no documentation of a liner.

Reference: 1, 2

Documentation for Ground Water Containment, Source heap leach pile:

The leach pad has no liner or runoff management system.

Reference: 1

Net Precipitation

Net Precipitation (inches)

N.A.

UNC-San Mateo Mine - 11/29/95

Aquifer: Alluvial Aquifer

Type of Aquifer: Non Karst

Overlaying Aquifer: 0

Interconnected with: 0

OBSERVED RELEASE

Distance No. Well ID Well Type (miles) Level of Contamination

- N/A and/or data not specified

\_\_\_\_\_\_\_\_

Observed Release Factor 0

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: GROUND WATER PATHWAY LIKELIHOOD OF RELEASE Alluvial Aquifer AQUIFER UNC-San Mateo Mine - 11/29/95

POTENTIAL TO RELEASE

Containment

Containment Factor

10

Net Precipitation

Net Precipitation Factor

1

Depth to Aquifer

A. Depth of Hazardous Substances

5.00 feet

Documentation for Depth of Hazardous Substances:

This is an estimate based on a 1994 SAIC contour map of the site showing the heap leach pile at a lower elevation than the surrounding area. It is estimated that the waste rock was deposited 5 feet below the ground surface.

Reference: 1

B. Depth to Aquifer from Surface

20.00 feet

Documentation for Depth to Aquifer from Surface :

The depth to aquifer is unknown in the vicinity of the site is unknown. However, a well located approximately 2 miles east of the site is drilled to depth of 37 feet. The static water level in the well is reportedly at 13 feet below the ground surface. Therefore, the depth to aquifer is estimated to be 20 feet below ground surface.

#### PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: GROUND WATER PATHWAY LIKELIHOOD OF RELEASE Alluvial Aquifer AQUIFER UNC-San Mateo Mine - 11/29/95

Reference: 1

Depth to Aquifer (B - A)

15.00

feet

20

Depth to Aquifer Factor

5

Travel Time

Are All Layers Karst?

NO

Thickness of Layer(s) with Lowest Conductivity

0.00

feet

Documentation for Thickness of Layers with Lowest Conductivity:

The thickness of the layers with lowest hydraulic conductivity is unknown.

Reference:

Hydraulic Conductivity (cm/sec)

1.0E-05

Documentation for Hydraulic Conductivity:

The lowest hydraulic conductivity is estimated to be 1e-5 based on limited geologic descriptions of the area.

Reference: 1

Travel Time Factor

35

\_\_\_\_\_\_\_

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 GROUND WATER PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 40000.00

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value	
Arsenic	10000	1.00E-02	1.00E+02	
Barium	10000	1.00E-02	1.00E+02	
Lead	10000	2.00E-05	2.00E-01	
Selenium	100	1.00E-02	1.00E+00	
Uranium	100	2.00E-07	2.00E-05	
Vanadium	100	2.00E-07	2.00E-05	

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## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 GROUND WATER PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value	
Arsenic	10000	1.00E-02	1.00E+02	
Barium	10000	1.00E-02	1.00E+02	
Lead	10000	2.00E-05	2.00E-01	
Selenium	100	1.00E-02	1.00E+00	
Uranium	100	2.00E-07	2.00E-05	
Vanadium	100	2.00E-07	2.00E-05	

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PREscore 3.0 - PRESCORE.TCL File 07/25/94 GROUND WATER PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Hazardous Substances Found in an Observed Release

Well Observed Release No. Hazardous Substance

Value

Toxicity Mobility Value

Toxicity/ Mobility

Value

PAGE: 23

- N/A and/or data not specified

Q.

# PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 GROUND WATER PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

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Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+02
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	1.00E+02
Sum of Source Hazardous Waste Quantity Values:	4.04E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	32

#### PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 25 GROUND WATER PATHWAY TARGETS FOR AQUIFER Alluvial Aquifer UNC-San Mateo Mine - 11/29/95

Population by Well

Distance Level of No. Well ID Sample Type (miles) Contamination Population

- N/A and/or data not specified

Level I Population Factor: 0.00

Level II Population Factor: 0.00

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: GROUND WATER PATHWAY TARGETS FOR AQUIFER Alluvial Aquifer UNC-San Mateo Mine - 11/29/95

## Potential Contamination by Distance Category

Distance Category (miles)	Population	Value
> 0 to 1/4	0.0	0.00E+00
> 1/4 to 1/2	0.0	0.00E+00
> 1/2 to 1	0.0	0.00E+00
> 1 to 2	3.0	7.00E-02
> 2 to 3	6.0	5.00E-02
> 3 to 4	0.0	0.00E+00

Potential Contamination Factor:

0.120

Documentation for Target Population > 1 to 2 miles Distance Category:

The well is located at the Marcus Ranch. It is reportedly used for domestic and stock use. The well is drilled to a depth of 210 feet. It is assumed that the well provides water for 3 residents of the ranch.

Reference: 1

Documentation for Target Population > 2 to 3 miles Distance Category:

The Lee well and the Red River well are located within the 2-3 mile radius of the site. The Lee well is 37 feet deep. The depth of the Red River well is unknown. The Maximum Contaminant Levels (MCLs) for gross alpha activity and selenium concentrations were exceeded in the Red River Ranch well, however, this could be due to the location of the well within an ore-bearing geologic formation. Three residents were apportioned to each well.

Reference: 1, 3

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: GROUND WATER PATHWAY TARGETS FOR AQUIFER Alluvial Aquifer UNC-San Mateo Mine - 11/29/95

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Nearest Well

Level of Contamination: Potential

Distance in miles: 1.60

Nearest Well Factor: 5.00E+00

Documentation for Nearest Well:

The nearest well to the San Mateo site is located approximately 1.6 miles northwest at the Marcus Ranch.

Reference: 1, 3

Resources

Resource Use: YES

Resource Factor: 5.00E+00

Documentation for Resources:

Water in the shallow aquifer is usable for drinking water purposes.

Reference: 1

Wellhead Protection Area

No wellhead protection area

Wellhead Protection Area Factor: 0.00E+00

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 SURFACE WATER PATHWAY SEGMENT SUMMARY UNC-San Mateo Mine - 11/29/95

No. Segment ID	Segment Type	Water Type	Start Point (mi)	End Point (mi)	Average Flow (cfs)	
1 unnamed arroyo 2 San Mateo Creek	River River	Fresh Fresh	0.00	0.60	0 100	

Documentation for segment: unnamed arroyo:

The unnamed arroyo is located on the eastern border of the site. Runoff from the site enters the arroyo and flows 0.6 mile north before discharging into San Mateo Creek. The PPE is located at the point where runoff from the site enters the arroyo.

Reference: 1, 5

Documentation for segment: San Mateo Creek:

The San Mateo Creek is shown to be perennial on the San Mateo, New Mexico 7.5 minute topographic map for a small segment of the surface water pathway.

Reference: 1, 5

PAGE: 28

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 29
SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
UNC-San Mateo Mine - 11/29/95

#### OBSERVED RELEASE

No. Sample ID	Sample Type	Distance (miles)		f Contamina HFC	ation Env
1 sed-3 2 sed-2	Sediment Sediment	0.100		Level II Potential	
Sample Hazardous Substa No.	nce	Concent	. Units		
1 Arsenic		3.1E+03	ppb		
1 Barium		5.9E+04			
1 Lead		5.3E+03			
1 Selenium		2.7E+03			
1 Selenium 1 Uranium			ppb		
1 Vanadium		3.0E+04	ppb		
2 Arsenic		2.3E+03	ppb		
2 Barium		3.0E+04			
2 Lead		4.2E+03	ppb		
2 Uranium		1.6E+03	ppb		
2 Vanadium		7.2E+03	ppb		
		========	=======		

Documentation for Observed Release, Sample sed-3:

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 3 was collected in the arroyo draining the mine tailings area.

Observed Release Factor 550

Reference: 1

Documentation for Observed Release, Sample sed-2

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 2 was collected from San Mateo Creek downstream of the PPE.

Reference: 1

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 30 SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE UNC-San Mateo Mine - 11/29/95

POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

No.	Source ID	HWQ Value	Containment Value
	tailings pile	4.00E+04	10
	heap leach pile	3.70E+02	10

\_\_\_\_\_\_

Containment Factor: 10

Documentation for Overland Flow Containment, Source tailings pile: The tailings have no cover or run-on control devices.

Reference: 1, 2

Documentation for Overland Flow Containment, Source heap leach pile: There is no runon or run-off management system at the site.

Reference: 1

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 31 SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE UNC-San Mateo Mine - 11/29/95

Distance to Surface Water	
Distance to Surface Water:	100.0 feet
Distance to Surface Water Factor:	20
Documentation for Distance to Surface Water:  Runoff from the tailings pile and heap leach pile	follow overland
drainage patterns until flowing into the unnamed i on the eastern border of the site.	ntermittent arroyo
Reference: 1, 5	
Runoff	
A. Drainage Area:	2.0 acres
B. 2-year, 24-hour Rainfall:	1.5 inches
Documentation for Rainfall:	
Reference: 4	
C. Soil Group:  Moderately-fine textured soils with low infiltra	C tion rates
Runoff Factor:	1
Potential to Release by Overland Flow Factor:	210

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 32 SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE UNC-San Mateo Mine - 11/29/95

Potential to Release by Flood

Potential to Release by Flood Factor: 0

Documentation for Flood Containment, Source tailings pile:

There is no flood containment at the site.

Reference: 1, 2

Documentation for Flood Frequency, Source tailings pile:

The site is not located within a flood plain.

Reference: 1

Documentation for Flood Containment, Source heap leach pile:

The heap leach pile has no flood containment.

Reference: 1

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 33
SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
UNC-San Mateo Mine - 11/29/95

Documentation for Flood Frequency, Source heap leach pile:

The site does not lie within a flood plain.

Reference: 1

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 34
SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 40000.00

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Arsenic	10000	1.00E+00	1.00E+04
Barium	10000	1.00E+00	1.00E+04
Lead	10000	1.00E+00	1.00E+04
Selenium	100	1.00E+00	1.00E+02
Uranium	0	1.00E+00	0.00E+00
Vanadium	100	1.00E+00	1.00E+02

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 35 SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Arsenic	10000	1.00E+00	1.00E+04
Barium	10000	1.00E+00	1.00E+04
Lead	10000	1.00E+00	1.00E+04
Selenium	100	1.00E+00	1.00E+02
Uranium	0	1.00E+00	0.00E+00
Vanadium	100	1.00E+00	1.00E+02

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 36 SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

#### Hazardous Substances Found in an Observed Release

Sampl No.	e Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
1	Arsenic	10000	1.00E+00	1.00E+04
1	Barium	10000	1.00E+00	1.00E+04
1	Lead	10000	1.00E+00	1.00E+04
1	Selenium	100	1.00E+00	1.00E+02
1	Uranium	100	1.00E+00	1.00E+02
1	Vanadium	100	1.00E+00	1.00E+02
2	Arsenic	10000	1.00E+00	1.00E+04
2	Barium	10000	1.00E+00	1.00E+04
2	Lead	10000	1.00E+00	1.00E+04
2	Uranium	100	1.00E+00	1.00E+02
2	Vanadium	100	1.00E+00	1.00E+02

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 37 SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Toxicity/Persistence Value from Source Hazardous Substances:	1.00E+04
Toxicity/Persistence Value from Observed Release Hazardous Substances:	1.00E+04
Toxicity/Persistence Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	4.04E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 38
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

#### Level I Concentrations

- N/A and/or data not specified

#### Level II Concentrations

Sample ID: sed-3

Sample Medium: Sediment

Location: 0.10 miles

Hazardous Substance	Hazardous Substance Concentration	DW MCL Benchmark Concentration	Units
Arsenic	3.1E+03	N.A.	ppb
Barium	5.9E+04	N.A.	ppb
Lead	5.3E+03	N.A.	ppb
Selenium	2.7E+03	N.A.	ppb
Uranium	2.9E+03	N.A.	ppb
Vanadium	3.0E+04	N.A.	ppb

#### Documentation for sed-3:

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 3 was collected in the arroyo draining the mine tailings area.

#### Reference: 1

Sample ID: sed-2

Sample Medium: Sediment

Location: 0.70 miles

Hazardous Substance	Hazardous Substance Concentration	DW MCL Benchmark Concentration	Units
Arsenic	2.3E+03	N.A.	ppb
Barium	3.0E+04	N.A.	ppb
Lead	4.2E+03	N.A.	ppb
Uranium	1.6E+03	N.A.	ppb
Vanadium	7.2E+03	N.A.	dag

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 39
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

Documentation for sed-2

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 2 was collected from San Mateo Creek downstream of the PPE.

Reference: 1

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

Sample ID: sed-2

Distance from the Probable Point of Entry: 0.70 miles

Documentation for sed-2

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 2 was collected from San Mateo Creek downstream of the PPE.

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 40
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

Level I Concentrations

Distance Along the

In-water Segment from the

Intake Probable Point of Entry (miles) Population

- N/A and/or data not specified

\_\_\_\_\_\_\_

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 41
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

Level II Concentrations

Intake

Distance Along the

In-water Segment from the

Probable Point of Entry (miles) Population

- N/A and/or data not specified

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 42 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Potential Contamination \_\_\_\_\_\_

Intake ID

Average Annual Flow (cfs)

Population Served \_\_\_\_\_\_\_

- N/A and/or data not specified

Type of Surface Water Body

Total Dilution-Weigh Population Population Dilution-Weighted

- N/A and/or data not specified

Dilution-Weighted Population Served by Potentially Contaminated Intakes:

0.0

Potential Contamination Factor: 0.0

Nearest Intake -----------

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: YES

Resource Value: 5.00E+00

Documentation for Resources:

The Marcus Ranch reportedly uses surface water for domestic and stock purposes.

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 43
SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 40000.00

Hazardous Substance	Toxicity Value	Persistence Value	Bio- accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Selenium	100	1.00E+00	5.00E+01	5.00E+03
Uranium	0	1.00E+00	5.00E-01	0.00E+00
Vanadium	100	1.00E+00	5.00E-01	5.00E+01

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 44 SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Toxicity Value	Persistence Value	Bio- accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Selenium	100	1.00E+00	5.00E+01	5.00E+03
Uranium	0	1.00E+00	5.00E-01	0.00E+00
Vanadium	100	1.00E+00	5.00E-01	5.00E+01

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 45
SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
UNC-San Mateo Mine - 11/29/95

#### Hazardous Substances Found in an Observed Release

Sample No.	e Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Bio- accum. Value	Toxicity/ Persistence/ Bioaccum. Value
1	Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
1	Barium	10000	1.00E+00	5.00E-01	5.00E+03
1	Lead	10000	1.00E+00	5.00E+03	5.00E+07
1	Selenium	100	1.00E+00	5.00E+01	5.00E+03
1	Uranium	100	1.00E+00	5.00E-01	5.00E+01
1	Vanadium	100	1.00E+00	5.00E-01	5.00E+01
2	Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
2	Barium	10000	1.00E+00	5.00E-01	5.00E+03
2	Lead	10000	1.00E+00	5.00E+03	5.00E+07
2	Uranium	100	1.00E+00	5.00E-01	5.00E+01
2	Vanadium	100	1.00E+00	5.00E-01	5.00E+01

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 46 SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances:	5.00E+07
Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances:	5.00E+07
Toxicity/Persistence/Bioaccumulation Factor:	5.00E+07
Sum of Source Hazardous Waste Quantity Values:	4.04E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	560

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 47
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

#### Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

Sample ID: sed-3

Sample Medium: Sediment Location: 0.10 miles

Hazardous Substance	Hazardous Substance Concentration	FDAAL Benchmark Concentration	Units
Arsenic	3.1E+03	N.A.	ppb
Barium	5.9E+04	N.A.	ppb
Lead	5.3E+03	N.A.	ppb
Selenium	2.7E+03	N.A.	ppb
Uranium	2.9E+03	N.A.	ppb
Vanadium	3.0E+04	N.A.	ppb

#### Documentation for sed-3:

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 3 was collected in the arroyo draining the mine tailings area.

Reference: 1

### Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

Sample ID: sed-3

Distance from the Probable Point of Entry: 0.10 miles

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 48 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Documentation for sed-3:

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 3 was collected in the arroyo draining the mine tailings area.

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 49 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Level I Concentrations

Annual Production Human Food Chain (pounds) Fishery

Population Value

- N/A and/or data not specified

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 50 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Level II Concentrations

Annual Production Human Food Chain (pounds) Fishery Population Value

- N/A and/or data not specified

\_\_\_\_\_\_\_

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 51
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

### Potential Contamination

Type of Average

Annnual Surface Annual Pop. Dilution

Production Water Flow Value Weight

Fishery (pounds) Body (cfs) (Pi) (Di) Pi\*Di

- N/A and/or data not specified

\_\_\_\_\_\_\_

Sum of (Pi\*Di): 0.00E+00

Potential Human Food Chain Contamination Factor: 0.00E+00

Food Chain Individual

Location of Nearest Fishery: N.A.

Food Chain Individual Factor: 0.00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 52 SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 40000.00

Hazardous Substance	Eco- toxicity Value	Persistence Value	Bio- accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Arsenic	10	1.00E+00	5.00E+01	5.00E+02
Barium	1	1.00E+00	5.00E-01	5.00E-01
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Selenium	100	1.00E+00	5.00E+03	5.00E+05
Uranium	0	1.00E+00	5.00E-01	0.00E+00
Vanadium	0	1.00E+00	5.00E-01	0.00E+00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 53 SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Eco- toxicity Value	Persistence Value	Bio- accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Arsenic	10	1.00E+00	5.00E+01	5.00E+02
Barium	1	1.00E+00	5.00E-01	5.00E-01
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Selenium	100	1.00E+00	5.00E+03	5.00E+05
Uranium	0	1.00E+00	5.00E-01	0.00E+00
Vanadium	0	1.00E+00	5.00E-01	0.00E+00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 54 SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Hazardous Substances Found in an Observed Release

Sample No.	e Observed Release Hazardous Substance	Eco- toxicity Value	Persistence Value	Bio- accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
1	Arsenic	10	1.00E+00	5.00E+01	5.00E+02
1	Barium	1	1.00E+00	5.00E-01	5.00E-01
1	Lead	1000	1.00E+00	5.00E+03	5.00E+06
1	Selenium	100	1.00E+00	5.00E+03	5.00E+05
1	Uranium	100	1.00E+00	5.00E-01	5.00E+01
1	Vanadium	100	1.00E+00	5.00E-01	5.00E+01
2	Arsenic	10	1.00E+00	5.00E+01	5.00E+02
2	Barium	1	1.00E+00	5.00E-01	5.00E-01
2	Lead	1000	1.00E+00	5.00E+03	5.00E+06
2	Uranium	100	1.00E+00	5.00E-01	5.00E+01
2	Vanadium	100	1.00E+00	5.00E-01	5.00E+01

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 55 SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances:	ce 5.00E+06
Ecotoxicity/Persistence/Bioaccummulation Value from Observelease Hazardous Substances:	rved 5.00E+06
Ecotoxicity/Persistence/Bioaccummulation Factor:	5.00E+06
Sum of Source Hazardous Waste Quantity Values:	4.04E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	320

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 56 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS UNC-San Mateo Mine - 11/29/95

#### Level I Concentrations

- N/A and/or data not specified

#### Level II Concentrations

Sample ID: sed-3

Sample Medium: Sediment Location: 0.10 miles

Hazardous Substance	Hazardous Substance Concentration	AWQC Benchmarks Concentrations FRESH SALT	Units
Arsenic Barium Lead Selenium Uranium	3.1E+03 5.9E+04 5.3E+03 2.7E+03 2.9E+03	N.A. N.A. N.A. N.A. N.A.	ppb ppb ppb ppb
Vanadium	3.0E+04	N.A.	ppb

#### Documentation for sed-3:

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 3 was collected in the arroyo draining the mine tailings area.

#### Reference: 1

Sample ID: sed-2

Sample Medium: Sediment

Location: 0.70 miles

Hazardous Substance	Hazardous Substance Concentration	AWQC Benchmarks Concentrations FRESH SALT	Units
Arsenic	2.3E+03	N.A.	ppb
Barium	3.0E+04	N.A.	ppb
Lead	4.2E+03	N.A.	ppb
Uranium	1.6E+03	N.A.	ppb
Vanadium	7.2E+03	N.A.	ppb

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 57 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Documentation for sed-2

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 2 was collected from San Mateo Creek downstream of the PPE.

Reference: 1

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

Sample ID: sed-2

Distance from the Probable Point of Entry: 0.70 miles

Documentation for sed-2 :

The samples were collected on 30 June and 1 July 1993 by SAIC. Sediment 2 was collected from San Mateo Creek downstream of the PPE.

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 58
SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
UNC-San Mateo Mine - 11/29/95

Level I Concentrations

Sensitive Environment	Distance from Description Point of Entry Sensitive Env.	to	Environment	
- N/A and/or data not	specified			-
Sum of Sensitive Environ	nments Values:		0	-
Wetlands				
Pos	stance from Probable int of Entry to cland (miles)	,	ands tage (miles)	
- N/A and/or data not	specified			-
Total Wetlands Frontage	: 0.00 Miles	Total Wetlan	ds Value: 0	-
sum of Sensitive Enviror	ments Value + Wetlar	nds Value: 0.	00E+00	=

Level I Concentrations Factor: 0.00E+00

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 59 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Level II Concentrations

Sensitive Environment	Point of Enti	n Probable ry to r. (miles)	Environment
- N/A and/or data	not specified		
Sum of Sensitive Envi	ronments Values:		0
Wetlands			
Wetland	Distance from Probabl Point of Entry to Wetland (miles)	Wetla	nds age (miles)
- N/A and/or data	not specified		
Total Wetlands Fronta	ge: 0.00 Miles	Total Wetland	s Value: 0
Sum of Sensitive Envi	ronments Value + Wet	ands Value: 0.0	0E+00

Level II Concentrations Factor: 0.00E+00

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 60 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Potential Contamination

Sensitive Environments

Type of Surface

Water Body Sensitive Environment

Sensitive Environment Value

Wetlands

Type of Surface

Water Body Sensitive Environment Frontage Value

Wetlands Wetlands

- N/A and/or data not specified

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 61 SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS UNC-San Mateo Mine - 11/29/95

Sum of

Sum of Sens. Wetland Dilution Environment Frontage Weight

Type of Surface Water Body

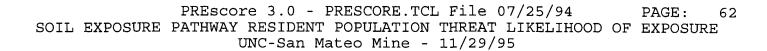
Values(Sj) Values(Wj) (Dj) Dj(Wj+Sj)

- N/A and/or data not specified

Sum of Dj(Wj+Sj): 0.00E+00 Sum of Dj(Wj+Sj)/10: 0.00E+00

\_\_\_\_\_\_

Potential Contamination Sensitive Environment Factor: 0.00E+00



Likelihood of Exposure

No.	Source ID	Level of Contamination
	tailings pile heap leach pile	Level I Level I
	Likelihood of	Exposure Factor: 550

Documentation for Area of Contamination, Source tailings pile:

The estimated area of the tailings pile is based on information in the 1994 SAIC report and the 1988 Hazardous Waste site Identification.

Reference: 1, 2

Documentation for Area of Contamination, Source heap leach pile:

The estimated area is based on information in the 1994 SAIC report.

Source Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1 Arsenic 1 Barium 1 Lead 1 Selenium 1 Uranium 1 Vanadium 2 Arsenic 2 Barium 2 Lead 2 Selenium 2 Uranium	< 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2	2.0E+01 5.0E+02 1.3E+01 1.4E+02 3.9E+02 7.2E+01 4.1E+00 2.3E+02 2.4E+01 2.2E+01 2.3E+03	3.3E-01 0.0E+00 0.0E+00 0.0E+00 0.0E+00 3.3E-01 0.0E+00 0.0E+00 0.0E+00	1.7E+02 4.1E+04 0.0E+00 2.9E+03 0.0E+00 4.1E+03 1.7E+02 4.1E+04 0.0E+00 2.9E+03 0.0E+00	bbw bbw bbw bbw bbw bbw bbw bbw

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 63
SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT LIKELIHOOD OF EXPOSURE
UNC-San Mateo Mine - 11/29/95

2 Vanadium

< 2 2.9E+02 0.0E+00 4.1E+03 ppm

Documentation for Source tailings pile, Contaminants:

Samples were collected by SAIC on June 30 and July 1, 1993 at the San Mateo site. Four soil samples were collected from the general mining and tailings area. However, because of relatively high radioactivity of the tailings pile measured during site screening, no samples of the pile itself were collected. The four soil samples were used to describe the tailings pile.

Reference: 1

Documentation for Source heap leach pile, Contaminants:

The samples were collected on June 30 and July 1, 1993 by SAIC at the San Mateo site. Analysis of the samples revealed significant concentrations of metals in the leach pile. Barium, lead, selenium, vanadium and uranium were found in concentrations greater than three times the background sample.

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 64 SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	
Arsenic	10000	
Barium	10000	
Lead	10000	
Selenium	100	
Uranium	0	
Vanadium	100	

# PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 65 SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Toxicity Value	
Arsenic	10000	
Barium	10000	
Lead	10000	
Selenium	100	
Uranium	0	
Vanadium	100	

PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 66
SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
UNC-San Mateo Mine - 11/29/95

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	3.70E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

#### 67

#### PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT TARGETS UNC-San Mateo Mine - 11/29/95

### Targets

Level I Population:

0.0

Value:

0.00

Level II Population:

0.0

Value:

0.00

Workers:

0.0

Value:

0.00

Documentation for Workers:

The site is inactive.

Reference: 1, 2

Resident Individual: Potentia

Value:

0.00

Resources:

YES

Value:

5.00

Documentation for Resources:

Cattle reportedly graze the site.

Reference: 1

Terrestial Sensitive Environment

- N/A and/or data not specified

Terrestrial Sensitive Environments Factor: 0.00

#### Likelihood of Exposure

No.	Source ID	Level of Contamination	Attractiveness/ Accessibility	Area of Contam. (sq. feet)		
	tailings pile heap leach pile	Level I Level I	50 50	625000 100000	_	
Highest Attractiveness/Accessibility Value: 50 Sum of Eligible Areas Of Contamination (sq. feet): 725000 Area of Contamination Value: 100						

Likelihood of Exposure Factor Category: 375

Documentation for Attractiveness/Accessibility, Source tailings pile:

The site is located in the Cibola National Forest designated for public use. However, it is fairly inaccessible.

Reference: 1

Documentation for Attractiveness/Accessibility, Source heap leach pile:

The site lies in the Cibola National Forest designated for public use. However, it is slightly inaccessible.

Source No.	e Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1 1 1 1 1 1 2	Arsenic Barium Lead Selenium Uranium Vanadium Arsenic	< 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2	2.0E+01 5.0E+02 1.3E+01 1.4E+02 3.9E+02 7.2E+01 4.1E+00	3.3E-01 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 3.3E-01	1.7E+02 4.1E+04 0.0E+00 2.9E+03 0.0E+00 4.1E+03 1.7E+02	ppm ppm ppm ppm ppm

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 69 SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE UNC-San Mateo Mine - 11/29/95

2	Barium	- 2	2 3 11 1 1 2	0 00.00	4.1E+04	nnm
4	Darrum	< 2	2.35702	0.05+00	4.15+04	ppա
2	Lead	< 2	2.4E+01	0.0E+00	0.0E+00	ppm
2	Selenium	< 2	2.2E+01	0.0E+00	2.9E+03	ppm
2	Uranium	< 2	2.3E+03	0.0E+00	0.0E+00	ppm
2	Vanadium	< 2	2.9E+02	0.0E+00	4.1E+03	maa

#### Documentation for Source tailings pile, Contaminants:

Samples were collected by SAIC on June 30 and July 1, 1993 at the San Mateo site. Four soil samples were collected from the general mining and tailings area. However, because of relatively high radioactivity of the tailings pile measured during site screening, no samples of the pile itself were collected. The four soil samples were used to describe the tailings pile.

Reference: 1

Documentation for Source heap leach pile, Contaminants:

The samples were collected on June 30 and July 1, 1993 by SAIC at the San Mateo site. Analysis of the samples revealed significant concentrations of metals in the leach pile. Barium, lead, selenium, vanadium and uranium were found in concentrations greater than three times the background sample.

### PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 70 SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 1 tailings pile

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	
Arsenic	10000	
Barium	10000	
Lead	10000	
Selenium	100	
Uranium	0	
Vanadium	100	

## PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 71 SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Source: 2 heap leach pile

Source Hazardous Waste Quantity Value: 370.37

Hazardous Substance	Toxicity Value	
Arsenic	10000	
Barium	10000	
Lead	10000	
Selenium	100	
Uranium	0	
Vanadium	100	

# PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 72 SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	3.70E+02
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

#### PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT TARGETS UNC-San Mateo Mine - 11/29/95

73

Nearby Individual

Population within 1/4 mile: 0.0

Nearby Individual Value: 0.0

Population Within 1 Mile

Travel Distance Category	Number of People	Value
> 0 to 1/4 mile	0.0	0.0
> 1/4 to 1/2 mile	0.0	0.0
> 1/2 to 1 mile	0.0	0.0

Population Within 1 Mile Factor: 0.0

OBSERVED RELEASE

No. Sample ID	Distance (miles)	Level of Contam	ination	
- N/A and/or data not spe	cified			
	=======	=============	========	========
		Observed Release	Factor	0

PAGE:

75

0

Gas Migration Potential

GAS POTENTIAL TO RELEASE

	Gas Contain. Value (A)	Туре	Value	Sum	Gas Potential to Rel. Value A(B+C)
- N/A and/or data no	 		·		

Gas Potential to Release Factor:

Documentation for Gas Containment, Source tailings pile:

The pathway was not evaluated because air sampling during the 1993 SAIC sampling mission did not reveal any airborne contaminants.

Reference: 1

Documentation for Source Type, Source tailings pile:

The tailings pile consists of waste rock disposed of in a series of spoils terraces. The rock consists mostly of barren shale and low grade mineralized rock. The pile is unreclaimed and has no vegatative cover.

Reference: 1, 2

Documentation for Gas Containment, Source heap leach pile:

The pathway was not evaluated because during the 1993 SAIC sampling mission, no airborne contaminants were detected.

Reference: 1

Documentation for Source Type, Source heap leach pile:

The waste source is a heap leach pile. The pile is not lined and has no vegetative covering. Details of the leaching operation and chemicals used are unknown. The pile is reportedly dry and consists of waste rock from the mining operation.

Reference: 1, 2

PAGE: 76

PAGE: 77

Source: tailings pile

Gaseous Hazardous Substance

Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7:

PAGE: 78

Source: heap leach pile

Hazardous Substance Gas Gaseous Hazardous Substance Migration Potential Value \_\_\_\_\_\_

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000 \_\_\_\_\_\_\_

Gas Migration Potential Value From Table 6-7:

PAGE: 79

Particulate Migration Potential

#### PARTICULATE POTENTIAL TO RELEASE

Source ID	Source Type	Partic. Contain Value (A)	Source .Type	 Sum	Partic. Potential to Rel. Value A(B+C)
- N/A and/or da	ata not specified			 	<b></b>

Particulate Potential to Release Factor:

0

Documentation for Source Type, Source tailings pile:

The tailings pile consists of waste rock disposed of in a series of spoils terraces. The rock consists mostly of barren shale and low grade mineralized rock. The pile is unreclaimed and has no vegatative cover.

Reference: 1, 2

Documentation for Source Type, Source heap leach pile:

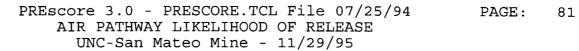
The waste source is a heap leach pile. The pile is not lined and has no vegetative covering. Details of the leaching operation and chemicals used are unknown. The pile is reportedly dry and consists of waste rock from the mining operation.

Reference: 1, 2

Source: tailings pile

Particulate Hazardous Substance

Arsenic Barium Lead Selenium Uranium Vanadium



Source: heap leach pile

Particulate Hazardous Substance

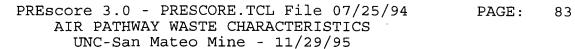
Arsenic Barium Lead Selenium

Uranium

Vanadium

PREscore 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 82 AIR PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Hazardous Substance Toxicity Gas Particulate Toxicity/ Value Mobility Mobility Mobility Value Value Value



Hazardous Substances Found in an Observed Release

Sample Observed Release ID Hazardous Substance Particulate Gas
Toxicity/ Toxicity/
Mobility Value Mobility Value

- N/A and/or data not specified

- N/A and/or data not specified



#### PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 84 AIR PATHWAY WASTE CHARACTERISTICS UNC-San Mateo Mine - 11/29/95

Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	0.00E+00
Sum of Source Hazardous Waste Quantity Values:	0.00E+00
Hazardous Waste Quantity Factor:	0
Waste Characteristics Factor Category: AIR PATHWAY TARGETS	0

#### PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 PAGE: 85

UNC-San Mateo Mine - 11/29/95

Actual Contamination

Distance No. Sample ID (miles) Level of Contamination

- N/A and/or data not specified

#### Potential Contamination

Distance Categories Subject to Potential Contamination		Populati	ion	Value	
		Contaminantion Contaminantion		0.0000	
	Potential	Contaminantion	Factor:	0.0000	
	Potential	Contaminantion	Factor:	0.0000	
	Potential	Contaminantion	Factor:	0.0000	
	Potential	Contaminantion	Factor:	0.0000	
	Potential	Contaminantion	Factor:	0.0000	

doc here

PREscore 3.0 - PRESCORE.TCL File 07/25/94 %2d %-20.20s %5.3lf %-10.10s UNC-San Mateo Mine - 11/29/95

Nearest Individual Factor

Distance in miles: Potentia

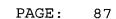
- N/A and/or data not specified

doc here

Resources

doc here

PAGE: 86



#### PREscore 3.0 - PRESCORE.TCL File 07/25/94 %2d %-20.20s %5.3lf

UNC-San Mateo Mine - 11/29/95

Actual Contamination, Sensitive Environments

Sensitive Environment		Sensitive Environment Value
- N/A and/or data not spe	ecified	
Actual Contamination, Wetla	ands	
	etland creage	Wetland Acreage Value
- N/A and/or data not spe	ecified	
(Sum of Sensitive Environme	======== ents + Wetland	======================================

## PREscore 3.0 - PRESCORE.TCL File 07/25/94 %2d %-20.20s %5.3lf %-10.10s UNC-San Mateo Mine - 11/29/95

PAGE:

88

Potential Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value		
(null)	4.9353858	434047461500000	00000000000	0000000e+257
Sum of Sensitive Environ	nments Weighte	d Values/10:		0.000
Potential Contamination,	Wetlands			
		Wetland Acreage Value		
- N/A and/or data not	specified		=========	
doc here				

### PRESCORE 3.0 - PRESCORE.TCL File 07/25/94 REFERENCES

PAGE:

89

UNC-San Mateo Mine - 11/29/95

- 1. Science Applications International Corporation (SAIC), 1994. Cibola National Forest-San Mateo Mine Site Inspection. January 1994.
- 2. New Mexico Environmental Improvements Division. 1988. Potential Hazardous Waste Site Identification, UNC-San Mateo Mine. 30 January 1988.
- 3. New Mexico Environmental Improvements Division. 1988. Preliminary Assessment of the UNC-San Mateo Site. 30 June 1988.
- 4. U.S. Department of Commerce. Technical Paper No. 40. Rainfall Frequency of the United States.
- 5. U.S. Geological Survey. 1963. San Mateo, New Mexico, 7.5 minute quadrangle map.
- 6. Rung, P. 1995. Record of Communication with Mr. Roy Cruz, U.S. Geological survey. 2 October 1995.
- 7. Rung, P. 1995. Record of Communication with Roberta Baca, U.S. Forest Service. 2 October 1995.
- 8. U.S. Environmental Protection Agency. 1995. Geographical Environmental Modeling System.

**REFERENCE 1** 

NM1223075515



MAY 2 4 1990

RECEIVED

MAY 041992

CENTER

Ms. Denise Gallegos
Program Manager
Abandoned Mine Land Bureau
State of New Mexico Energy, Minerals
and Natural Resources Department
2040 S. Pacheco
Santa Fe, NM 87505

Dear Ms. Gallegos:

Per our conversation on May 22, 1990, I have reviewed the two sites which the Abandoned Mines Land Bureau was interested in, the Poison Canyon Site (NMD981600489) and UNC San Mateo Mine (NM1223075515). No further remedial action by Superfund was the determination for the Poison Canyon Site. I am enclosing a copy of the file which contains the Superfund Site Strategy Recommendation for this site. As we discussed, the U. S. Forest Service has been requested to provide the Environmental Protection Agency with additional information at the UNC San Mateo Mine. I am following up with the Forest Service as to the status of their investigation, and will inform you of the results of this investigation.

If you require additional information, or have any questions regarding other Superfund sites please feel free to contact me at (214) 655-6740.

Sincerely,

Barbara Driscoll, Environmental Protection Specialist Superfund Site Assessment Section 6H-MA

Enclosure

6H-MA:DRISCOLL:BD:5/23/90:Compag A:GALLEGOS:X6740

TAYLOR

W#2/90 5/24/90

#### MAY 2 4 1990

Ms. Denise Gallegos
Program Manager
Abandoned Mine Land Bureau
State of New Mexico Energy, Minerals
and Natural Resources Department
2040 S. Pacheco
Santa Fe, NM 87505

Dear Ms. Gallegos:

Per our conversation on May 22, 1990, I have reviewed the two sites which the Abandoned Mines Land Bureau was interested in, the Poison Canyon Site (NMD981600489) and UNC San Mateo Mine; (NMD9815) No further remedial action by Superfund was the determination for the Poison Canyon Site. I am enclosing a copy of the file which contains the Superfund Site Strategy Recommendation for this site. As we discussed, the U.S. Forest Service has been requested to provide the Environmental Protection Agency with additional information at the UNC San Mateo Mine. I am following up with the Forest Service as to the status of their investigation, and will inform you of the results of this investigation.

If you require additional information, or have any questions regarding other Superfund sites please feel free to contact me at (214) 655-6740.

Sincerely,

SUPERFUND FILE

Barbara Driscoll, Environmental Protection Specialist Superfund Site Assessment Section 6H-MA

MAR 26 1992

Enclosure

REORGANIZED

6H-MA:DRISCOLL:BD:5/23/90:Compaq A:GALLEGOS:X6740

SUPERFUND FILE

**TAYLOR** 

MAR 2 6 1992

\_<u>\_\_</u>\_\_\_

**REFERENCE 2** 

POTENTIAL HAZARDOUS WASTE	SITE IDENTIFICATION (D) N/M/223075515
NOTE: The initial identification of a potential site or in	
activity or confirmation that an actual health or	environmental lireat exists. All insultified sites will
be assessed under the EPA's Hazardous Waste S	Site Enforcement and Response System to determine if
a hazardous waste problem actually exists.	Uning 122 3075515
A. SITE HAME	B. STREET (or other identifier)T. 13N, R. 8E. sec. 30 NE'4
UNC San Mateo Mine	5½ mi. W. of San Mateo on SR53, 2½mi.Se. on dir
CITY .	D. STATE E. ZIP CODE F. COUNTY NAME
San Mateo (approx. 4 miles east of site)	NM . 87050   Cibola / 1/2
. OWNER/OPERATOR (II known)/Rare Metals Corp. 1959	
/El Paso Natural Gas 19	`
U.S. Forest Service /United Nuclear Corp. 1	964-1971 (303) 883-8901 (UNC)
TYPE OF OWNERSHIP (if known)	
	INICIPAL S. FRIVATE G. UNKNOWN
site descaiption UNC San Mateo mine is an inact	
approximately 12 miles NE of Grants in the A	
• •	west of the town of San Mateo, and is located
	of the ephemeral San Mateo Creek. Associated
	ap-leach pond (combined surface area approximat
	and no reclamation had been performed as of
	ed one open vent, that no head frame was presen
and the shaft area was collapsed.	
I. HOW IDENTIFIED (I.e., citizen's complaints, OSHA citations, etc.)S	
following studies: EPA 520/1-83-007, 1983 a	
following studies: EPA 520/1-83-007, 1983 a	
following studies: EPA 520/1-83-007, 1983 a summary of POTENTIAL OR KNOWN PROBLEM  The spoils pile and dry heap-leach pond are in the adjacent arroyo and probably in San M	actively eroding with redeposition occurring lateo Creek (EPA, 1983; EID, 1986). The wastes
following studies: EPA 520/1-83-007, 1983 a summary of POTENTIAL OR KNOWN PROBLEM  The spoils pile and dry heap-leach pond are in the adjacent arroyo and probably in San M may also be eroded and redeposited by wind.	actively eroding with redeposition occurring lateo Creek (EPA, 1983; EID, 1986). The wastes At least three ranches are present downstream
following studies: EPA 520/1-83-007, 1983 a summary of POTENTIAL OR KNOWN PROBLEM  The spoils pile and dry heap-leach pond are in the adjacent arroyo and probably in San M may also be eroded and redeposited by wind. from the site, and livestock present in the	actively eroding with redeposition occurring lateo Creek (EPA, 1983; EID, 1986). The wastes At least three ranches are present downstream area have easy access to the site and to
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/

REFERENCE 3

### SEPA

#### LIENTIAL HAZARDOUS WASTE SITE

IDENTIFICATION AND PRELIMINARY ASSESSMENT

COICH	eleved ph Hal
1	- Amou by Mey
1 4	Alaria a a a a a a a a a a a a a a a a a a

6 NM1223075515

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent industrial records and on-eits inspections.

This does not constitute

final opinion of EPA

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (Preliminary
Assessment). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection
Agency: Site Tracking System; Hazardous Waste Enforcement Task Force (EN-315); 401 M St., SW; Washington, DC 20460.

Agency; Sits Tracking System; Hazardous waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.						
I. SITE IDENTIFICATION . IN IN 122-3075517						
A. SITE NAME	B. STREET (or other ide					
UNC San Mateo Mine			53. $2\frac{1}{2}$ mi.SE on			
C. CITY	D. STATE E. ZIP	l l	Y HAME dirt road.			
San Mateo (approx.4 miles east of site)	NM 870	50   Cibol	а			
G. OWNER/OPERATOR (II MONT) Rare Metals Corp. 1959-						
'El Paso Natural Gas 170	2-1964		HONE NUMBER 287-8833 (HSFS)			
U.S. Forest Service / United Nuclear Corp. 19	64-19/1	(505)	287-8833 (USFS) 883-6901 (UNC)			
M. TYPE OF OWNERSHIP  1. FEDERAL 2 STATE 3. COUNTY 4 MUNI						
i. SITE DESCRIPTION UNC San Mateo Mine is an unre						
spoils piles which are actively eroding into						
J. HOW IDENTIFIED (I.e., citizen's complaints, OSHA citations, etc.)	ite investigated	lin the course	K. DATE IDENTIFIED			
of the following two studies:	no <i>c</i>	,	(mo., dey, & yr.)			
EPA 520/1-83-007, 1983 and EID/GWH-86/2, 1	700		1983			
PRINCIPAL STATE CONTACT		12. TELEF	HONE NUMBER			
Randy Merker		1	827-2862			
IL. PRELIMINARY ASSESSMI	ENT (complete this one:	1				
A. APPARENT SERIOUSNESS OF PROBLEM						
	ES. UNKNOW	N .				
B. RECOMMENDATION SUPERFU	IND					
I. NO ACTION HEEDED (no hazard)  SUPERFO	2 IMMEDIATE SI	TE INSPECTION NEE LY SCHEDULED FOR	DED Q. 3.			
MAR 26	1992 5. WILL BE PE	RFORMED BY:	17			
REORGANI	ZED 4. SITE INSPECT	TION NEEDED (Iow pri	ority)			
			······································			
C. PREPARER INFORMATION	12. TELEPHONE	NUMBER	] ]. DA (E (MO., dey, & yr.)			
D 1 Markon NM FID	(505) 827-					
10 1.170 10 10 10 10 10		2002	June 30, 1988			
III. SITE INFORMATION						
A. SITE STATUS  1. ACTIVE (Those industrial or municipal sites which are being used for waste treament, storage, or disposal on a conditumny besis, even if: intre- quantity.)  2. INACTIVE (Those is 3. OTHER (specify):  (*Ance sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)						
B. AS GENERATOR ON SITE!			7			
1. NO X 2. YES (specify 4s	meretor's low-difit SIC C	ode): 1094	· ·			
C. AREA OF SITE (In ecree) D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES						
1. LATITUDE (degmineec.)						
approx. 100 acres 35° 19' 43" N		107 <sup>2</sup> 43' 12"	W			
	79 and 1980 indic	cate that only	building foundation			
	oin and 20' high					

			N OF SITE ACTIVITY		
Indicate the major site		s relating to each act		appropriate boxes.	
X' A. TRANSPORT	Λ	. STORER	G. TREATER	X D.	DISPOSEA
1. RAIL	- XII. PILE		1. FIL TRATION	1. LANDFIL	
2. SHIP		E IMPOUNDMENT	2. INCINERATION	2. LANDFAR	<u> </u>
3. BARGE	3. DRUMS		3. VOLUME REDUCTION		
X 4. TRUCK	X 4. TANK.	<del></del>	4. RECYCLING/RECOV		IMPOUNDMENT
S. PIPCLINE	S. TANK.	SELOW GROUND	S. CHEM./PHYS. TREA	TMENT S. MIDNIGHT	DUMPING
is. OTHER (specily):	- OTHER	(specify):	6. BIOLOGICAL TREAT	MENT   6. INCINERA	TION
• .		_	7. WASTE OIL REPROC		
•			SOLVENT RECOVER		pecily):
	j	14	of solids from	ttling Spoils	Pile
	Ì		extracted mine w	ator	•
A.4. Shipped o	re from mine sichemical storage	te to Kermac mi e in above grou	ll, presumably b nd tank (Anderso	y Cruck. This dos	NARY REPORT is not constitute nion of EPA
A WASSE SUFF		V. WASTE RELAT	ED INFORMATION	<del></del>	·
A. WASTE TYPE					
1 UHKHOWH X	Z LIQUID X3.	SOLID4. S	LUDGE .   S. GA	·s	•
S. WASTE CHARACTER	ISTICS			<del></del>	·····
		IGNITABLE TA 4. R	ADIOACTIVE S HI	GHLY VOLATILE	
· —	7 REACTIVE	. INERT IS F	LAMMABLE		
_					
10. OTHER (specify	r):	•	•		•
C. WASTE CATEGORIE	5		-	- 1	
Minewater disc	es available? Specify ite	ms such as manufests, in he 670 gallong	venunes, eu. below. In per minute in Fe	complete Record	s Unly.
			per minute in re vailable (NMEID.		maryses or
			gory; mark 'X' to indica		resent
a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	. SOLIDS	f. OTHER
AMOUNT	AMCUNT	AMOUNT .	AMOUNT	AMOUNT 6	AMOUNT
Unknown			Unknown	6 X 10 <sup>0</sup>	Unknown
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
				Cubic Feet	
X' (1) PAINT,	X' (I) OIL Y	X' (1 HALOGENATED	X (1) A CIDS	X (1) FLYASH	'XT LABORATORY
	l		<u></u>		li
12) METALS SLUDGES	(2) OTHER (apocity):	(2) NON-HALDGHTS SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(Z) HOSPITAL
(3) POTW		(3) OTHER(apocity)	(3) CAUSTICS	X MINE TAILINGS	X (3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS	(4) MUNICIPAL
(8) OTHER(*pecity):			ISI DYES/INKS	(S) NON-FERROUS	4
settling-pond sludge			(8) CYANIDE	161 OTHER (specify):	
			(7) PHENOLS		
			(6) HALOGENS		1.3
		·	(9) PC 3		
			(10) METALS		
-			(11) OTHER(epocity	7	
1	}	Ĭ.	1	1.	1

#### ASTE RELATED INFORMATION (cor

JACERN WHICH MAY BE ON THE SITE (Place IN &

ding order of hezerd,

Radium-226
Uranium

Selenium

Molybdenum

Arsenic Lead Vanadium Barium

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

Active erosion of the spoils pile and heap leach pile has resulted in observed releases of contaminants to drainage sediments and surface water. Sediment samples from adjacent drainages (Figure 2) contain elevated concentrations of radium-226, molybdenum, (Continued)

A. TYPE OF HAZARD  NO HAZARD  HUMAN HEALTH  NON-WORKER	B. POTEN- TIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT	E. REMARKS
HUMAN HEALTH			(2.0	
NON-WORKER	<u>X</u>			Exposure to arsenic, selenium, lead and the decay products of uranium
INJURY/EXPOSURE	х			and radium-2 as above; and open shaft (EPA,1983).
WORKER INJURY -				
CONTAMINATION OF WATER SUPPLY	х			See 7 & 8 below
CONTAMINATION OF FOOD CHAIN	x			cattle graze in the area and have ear access to the site and runoff.
CONTAMINATION OF GROUND WATER	х	T		Observed degredation of ground-water quality along San Mateo Creek (Table
CONTAMINATION OF SURFACE WATER	х		1982-1983	Observed contamination of surface, water and drainage sediments (Table 2
DAMAGE TO FLORA/FAUNA	x			Low pH of leachate and runoff.
O. FISH KILL				•
1. CONTAMINATION	х			Unreclaimed spoils piles; poorly vegetated; potential to be windblown
2. NOTICEABLE ODORS				
S. CONTAMINATION OF SOIL		х	1983	Observed contamination of drainage sediments (Figure 3).
4. PROPERTY DAMAGE	·			
S. FIRE OR EXPLOSION		1		
14. SPILLS/LEAKING CONTAINERS RUNOFF/STANDING LIQUIDS	1			
SEWER, STORM TO DRAIN PROBLEMS				
16, EROSION PROBLEMS		х	1980, 198	Erosion of spoils piles noted durin 32 site visits.(Anderson 1981,NMEID,19
19. INADEQUATE SECURITY		х	1980	"present fence is in poor condition and is ineffective". (Anderson, 1981)
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
2 2. OTHER (specity):	i	i		

onlinued From Front	·		
	· VI	I. PERMIT INFOR	MATION
INDICATE ALL APPLICABLE PERM	HELD BY THE	SITE. None Ki	nown
] 1. NPÓES PERMIT   2. SPC	PLAN " 🗀 3	. STATE PERMIT(+	pocify):
4. AIR PERMITS S. LOC	AL PERMIT 6	. RCRA TRANSPOR	TER
7. RCRA STORER S. RCR	A TREATER -	. RCRA DISPOSER	
10. OTHER (apocity):			
IN COMPLIANCET			•
1. YES 2. NO	٠ اـا ،	. UNKNOWN	•
4. WITH RESPECT TO (list regula	ilion neme & number)	·	
	VIII. P	AST REGULATOR	Y ACTIONS
A. NONE B. YE	S (summerize below)		• • • • • • • • • • • • • • • • • • • •
None Known			
·			•
			·
<del>· · · · · · · · · · · · · · · · · · · </del>	IX. INSPEC	TION ACTIVITY	(past or on-going)
A. HONE TO B. YES	(complete items 1,2	,3, & 4 below)	·
1. TYPE OF ACTIVITY	2 DATE OF PAST ACTION (mo., day, & yr.)	3 PERFORMED BY: (EPA/State)	4. DESCRIPTION
Inspections and			to certify validity of operation and
Certifications	1959,1960	AEC	eligibility for bonus payments.
Site Inspection and sediment sampling	~ 1983	EPA	EPA study: "Potential Health & Environment Hazards of Uranium Mine Wastes".
Sediment and surface	1		NMEID Study: "Impacts of Uranium Mining
water runoff sampling	~ 1986	NMEID	on Surface and Shallow Ground Waters,
	X. REM	EDIAL ACTIVITY	(past or on-going) Grants Mineral Belt, NM".
A. NONE B. YE	S (complete items 1,	2,3, & 4 below)	
1. TYPE OF ACTIVITY	Z. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
<del></del>	<del> </del>	<u> </u>	
	1		
	<del></del>	<u> </u>	
		ł.	

EPA Form T2070-2 (10-79)

PAGE 4 OF 4

SUPERFUND FILE

MAR 2 6 1992

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mm/223075515

Continuation Sheet

#### UNC SAN MATEO MINE - PRELIMINARY ASSESSMENT

V.C.4.

selenium, and gross alpha particle activity (Figure 3). Surface water samples (Figure 2) contained elevated levels of arsenic, lead, molybdenum, selenium, uranium, and vanadium as well as elevated gross alpha and gross beta particle activities (Table 2). The release of these contaminants to surface water may be due primarily to entrained sediment rather than leaching of contaminants from the waste piles (NM EID, 1986); see Table 3. Elevated concentrations of uranium, molybdenum, selenium, gross alpha particle activity, and gross beta particle activity were observed in wells down-gradient from the UNC San Mateo Mine as compared to wells up-gradient (Table 1). These elevated concentrations maybe primarily related to surface discharge of mine dewatering effluent rather than from tailings pile leachate (NM EID, 1986). The observed contamination in the down-gradient wells may be attributable to effluent discharged from mines upstream from the UNC San Mateo Mine.

NM 122 3075515

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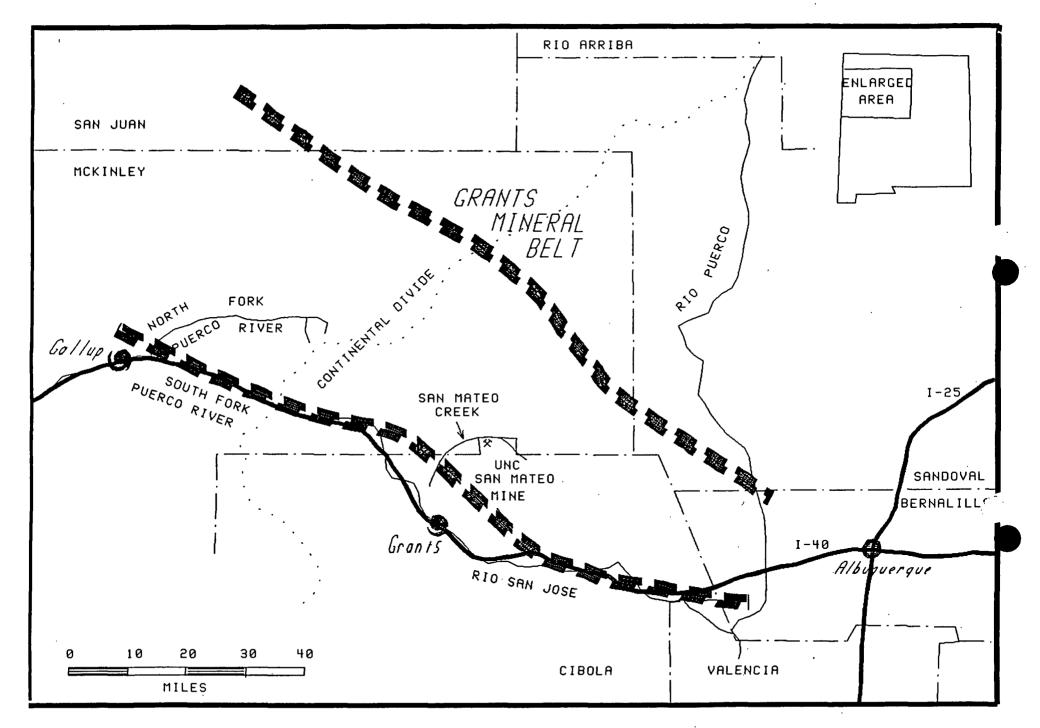


FIGURE 1. LOCATION OF UNC SAN MATEO MINE, GRANTS MINERAL BELT, NM.

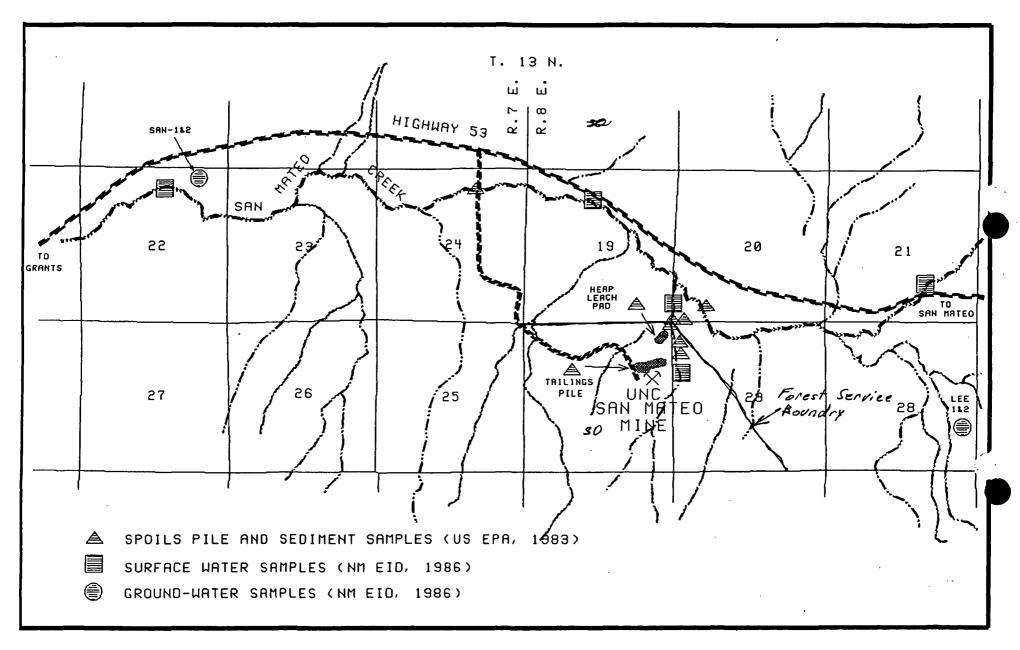
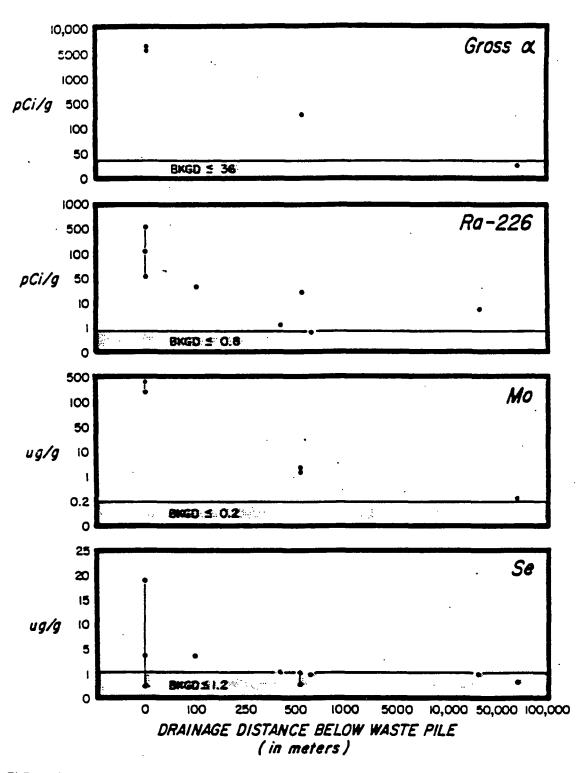


FIGURE 2. UNC SAN MATEO MINE - SAMPLE LOCATIONS.



Persistence/attenuation of selected contaminants in sediments within the drainage system below the UNC San Mateo Mine waste pile. Each analysis is represented by dot; some stations have multiple analyses. Three nearby stations were used to define natural background levels. NM EID, 1986.

TABLE 1. UNC San Mateo Mine - Mean trace element and radionuclide concentrations in wells in the San Mateo Creek drainage system, 1977-1982. Number of samples for each well is shown in parentheses and well locations are indicated in Figure 2. Data from NM EID, 1986.

Constituent	Lee-l	Lee-2	San-1	San-2
	<u>(13)</u>	(14)	(13)	(12)
As (ug/1)	· ND	6.8	ND	ND
Ba (ug/1)	133	113	112	108
Cd (ug/1)	ND	ND	ND	ND
Pb (ug/1)	ND	ND	ND	ND
Mo (ug/1)	ND	9.6	133	131
Se (ug/1)/	ND	ND	18.5	18.0
U (ug/1) ✓	ND	ND	222	251
V (ug/1)	ND	12	ND	ND
Zn (ug/1)	ND	ND	ND	ND
Ra-226 (pCi/1)	0.05	0.04	0.15	0.09
Gross Alpha (pCi	11)~ 4	6.6	184	209
Gross Beta (pCi/		4	89.	96

ND - not analytically detected

Table 2. UNC San Mateo Mine - Contaminant concentrations in waste-pile runoff as compared to natural runoff.

Number of samples in parentheses. After NMEID, 1986.

CONSTITUENT	MINE WASTE Range	PILE RUNOFF Median	NATURAL RU Range	NOFF Median
		(mg/1)		——————————————————————————————————————
AB	0.13-1.5	<b>6.5</b> (6)	0.05-0.26	₹0.13 *(6) <b>~</b>
Ва	1.7-37.5	10.9 (6)	1.4-43.5	7.7 (6)
Cđ	0.004-0.02	0.01 (6)	0.003-0.05	0.006 (6)
РЪ	0.44-2.5	1.3 (6)	0.05-2.0	0.52 (6)
Mo 4	<0.01-32	<b>7.6</b> (6)	0.005-<0.01	® <b>₹0.01</b> \$ (6) ✓
Se	<0.005-0.85	0.2 (6)	<0.005-0.15	<b>₹0.03</b> (6) ✓
U-natural	0.04-131	*34.4 <b>₹</b> (6)	0.03-0.56	(0.10 <sup>#</sup> (6) V
V 1	0.63-24.8	₹7.5 <sup>†</sup> (6)	0.18-3.2	<b>€0.61</b> (6) ✓
Zn	1-4.4	2.2 (6)	0.38-1.7	1.5 (6)
		(pCi/1)		
Gross Alpha 🕏	1,810-420,000	123,935 (6)	33-2,100	ू1,200 (5) ⊬
Gross Beta	1,150-168,000	47,725 (6)	546-2,000	1,060 (5)

TABLE 3. UNC San Mateo Mine - Results of Mine Waste Leaching Tests of 8 composite samples (EP Toxicity Water Extract).

Constituent	Average Concentration	NM Ground-Water Standard
As	0.029 mg/l	0.1 mg/1
. Ва	0.162 mg/1	1.0 mg/1
Cd	0.003 mg/l	0.01 mg/l
Pb	<0.005  mg/l	0.05 mg/1
Mo		1.0 mg/1 *
Se <sup>9</sup>	0.955 mg/l 0.069 mg/l	©0.05 mg/1 5 mg/1
U-natural	1.42 mg/1	5 mg/1
V	0.011 mg/l	no established standard
Zn	<0.05 mg/l	10.0 mg/1
Gross Alpha	1030 pCi/1	15 pCi/1 ** V
Gross Beta	164 pCi/1	15 pCi/1 ** / * 4 millirem/yr **

<sup>\*</sup>Standard for irrigation use; not established for domestic use. \*\*Natural intermim primary Drinking water standard, 1976.

Leach Test Data from NM EID, 1986.

m/m/223075515

#### REFERENCES CITED

- Anderson, Orin J.; 1981; Abandoned or inactive uranium mines in New Mexico; NM Bur. of Mines and Min. Res. OFR 148.
- NM EID; 1986; Impacts of uranium mining on surface and shallow ground waters Grants Mineral Belt, New Mexico; EID/GWH-86/2.
- US EPA; 1983; Potential health and environmnental hazards of uranium mine wastes; EPA 520/1-83-007.

**REFERENCE 4** 

#### Li inin H. Hodges, Sceretary

### TECHNICAL PAPER NO. 40

## RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

## for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by DAVID M. HERSHFIELD

Cooperative Studies Section, Hydrologic Services Division

for

Engineering Division, Soil Conservation Service U.S. Department of Agriculture



#### PREFACE

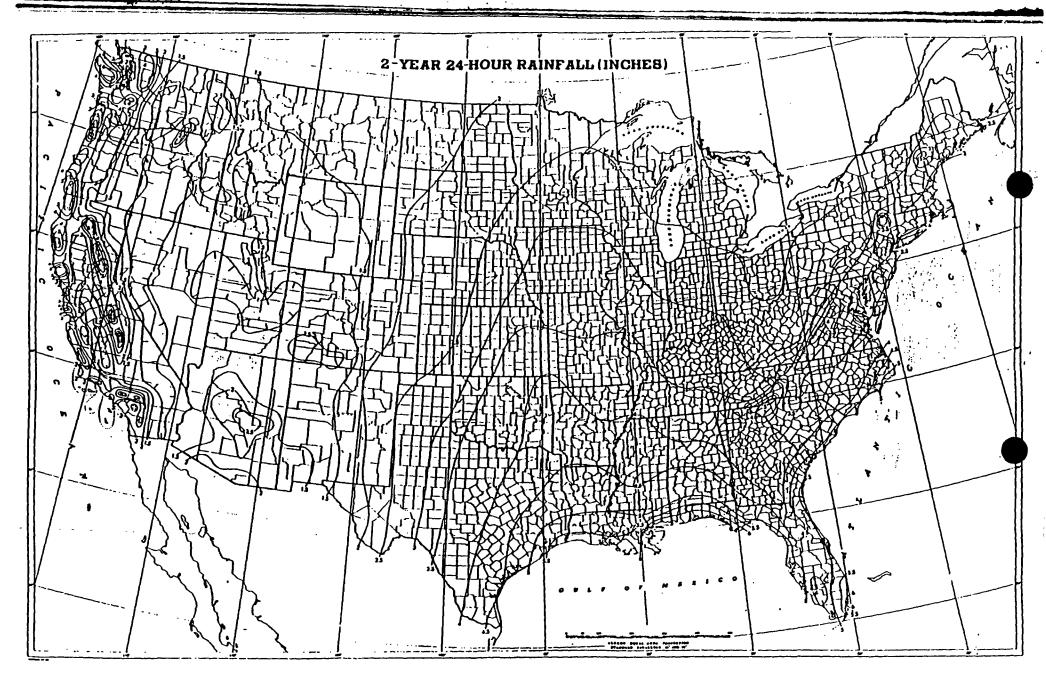
This publication is intended as a convenient summary of empirical relationships, working guides, and maps, useful in practical problems requiring rainfall frequency data. It is an outgrowth of several provious Weather Bureau publications on this subject prepared under the direction of the author and contains an expansion and generalization of the ideas and results in earlier papers. This work has been supported and financed by the Soil Conservation Service, Department of Agriculture, to provide material for use in developing planning and design criteria for the Watershed Protection and Flood Prevention program (P.L. 560, 83d Congress and as amended).

The paper is divided into two parts. The first part presents the rainfall analyses. Included are measures of the quality of the various relationships, comparisons with previous works of a similar nature, numerical examples, discussions of the limitations of the results, transformation from point to areal frequency, and seasonal variation. The second part presents 49 rainfall frequency maps based on a comprehensive and integrated cultertion of up-to-date statistics, several related maps, and seasonal variation diagrams. The rainfall frequency (impluvial) maps are for selected durations from 30 minutes to 24 hours and return periods from 1 to 100 years.

This study was prepared in the Cooperative Studies Section (Joseph L. H. Paulhus, Chief) of Hydrologic Services Division (William E. Hiatt, Chief). Coordination with the Soil Conservation Service, Department of Agriculture, was maintained through Harold O. Ogrosky, Chief, Hydrology Branch, Engineering Division. Assistance in the study was received from several people. In particular, the author wishes to acknowledge the help of William E. Miller who programmed the frequency and duration functions and supervised the processing of all the data; Normales S. Foat who supervised the collection of the basic data; Howard Thompson who prepared the maps for analysis; Walter T. Wilson, a former colleague, who was associated with the development of a large portion of the material presented here; Max A. Kobler, A. L. Shands, and Leonard L. Weiss, of the Weather Bureau, and V. Mockus and R. G. Andrews, of the Soil Conservation Service, who reviewed the manuscript and made many helpful suggestions. Caroli W. Gardner performed the drafting.

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Figure 5 Relation between 2 year 36 minute rainfall and 2-year 66 minute rainfall	2	31. 50-year 6-bung rainfati
Figure 6 - Relation fortures partial duration and annual series	2	35,- 1885-year (I-bour eninfall
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## PHONE CONVERSATION RECORD

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Name Koy Cruz	Time 7: 45 AM (PM )
Company <u>0.5.6.5.</u> Address	-  Originator Placed Call
Address	_ ☐ Originator Received Call
Phone	W.O. NO
Subject MC-Son Mates Mine	W.O. 1103
Notes: Mr. Cruz Stated 4	hat No wells were identified
within a finite radius	of the sik.
··.	
	•
	<u> </u>
☐ File	Follow-Up-Action:
☐ Tickle File//	_
☐ Follow-Up By:	
☐ Copy/Route To:	
	_
	Originator's Initials

**REFERENCE 7** 

.





### PHONE CONVERSATION RECORD

Conversation with:	Date
Name Xoberta Baca	AM/em')
Address Albuquerque	— DE Originator Placed Call  ☐ Originator Received Call
Phone 505 842-3829	W.O. NO
Subject UNC- San Mateo Mine	
	an PA and SI have been
	Mateo sik. She staked that
	iclides were revealed IN samples,
	NOT Score due to a lack of
	e been Natified and asked to
	for draw up of the site.
I asked for a copy of ,	the SI.
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☐ Capy/Route To:	— — — — — — — — — — — — — — — — — — —
	<del></del> . H
	Originator's Initials

**REFERENCE 8** 



## COVERAGE

STATE	COUNTY	STATE NAME	COUNTY NAME
35	31	New Mexico	Mc Kinley Co
35	61	New Mexico	Valencia Co

CENTER POINT AT STATE : 35 New Mexico

COUNTY: 31 Mc Kinley Co

REGION OF THE COUNTRY

Zipcode found: 87050 at a distance of 7.1 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
			<del></del>	
NM	SAN MATEO	35061	35.3317	107.6417

### CENSUS DATA

=========

UNC San Mateo Mine

LATITUDE 35:19:43 LONGITUDE 107:43:12 1995 POPULATION

KM	0.00400	.400810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	0	0	0	0
RING	•	0	0	0	0	0	0

## STAR STATION

WBAN NUMBER	STATION NAME	LATITUDE	LONGITUDE	PERIOD OF RECORD	DISTANCE (km)
93044	ZUNI/INTERMEDIATE NM	35.1000	108.800	1967-1971	101.3
23050	ALBUQUERQUE/SUNPT-KIRT NM	35.0500	106.617	1980-1984	104.8
23081	GALLUP/FAA AIRPORT	35.7833	108.783	1985-1989	108.6
23049	SANTA FE NM	35.6167	106.083	1950-1954	151.5
23090	FARMINGTON NM	36.7500	108.233	1954-1959	164.5
93045	TRUTH OR CONSEQUENCES NM	33.2333	107.267	1973-1977	236.5
23194	WINSLOW AZ	35.0167	110.733	1949-1954	275.8

U.S. SOIL DATA 

STATE : NEW MEXICO

LATITUDE : 35:19:43 LONGITUDE : 107:43:12

THE STATION IS INSIDE H.U. 13020207

GROUND WATER ZONE RUNOFF SOIL TYPE 2

EROSION : 2.3660E-04 CM/MONTH

DEPTH TO GROUND WATER BETWEEN : 6.0960E+02 AND 1.2190E+04

FIELD CAPACITY FOR TOP SOIL : 7.2000E-02 EFFECTIVE POROSITY BETWEEN : 2.0000E-02 AND 2.0000E-01

SEEPAGE TO GROUNDWATER BETWEEN: 4.6330E+02 AND 5.5600E+03 CM/MONTH

DISTANCE TO DRINKING WELL : 2.8000E+04 CM



# CIBOLA NATIONAL FOREST - SAN MATEO MINE SITE INSPECTION

January 1994

#### PREPARED FOR:

United States Department of Agriculture
Forest Service
517 Gold Avenue SW
Albuquerque, New Mexico 87102-0084

#### PREPARED BY:

Science Applications International Corporation Environmental Remediation Division 14062 Denver West Parkway Building 52, Suite 200 Golden, Colorado 80401



Contract No. 53-8371-2-68

**Modification 15** 

Final Deliverable for Task 2, Phase 2, Item 4

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#### 1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986, the U. S. Department of Agriculture (USDA) Forest Service acting as lead agency, contracted with Science Applications International Corporation (SAIC) to conduct a screening Site Inspection (SI) at the United Nuclear Corporation (UNC) San Mateo Mine site in the Cibola National Forest, New Mexico. The purpose of the SI was to collect information concerning conditions at the San Mateo Mine Site sufficient to assess the threat posed to human health and the environment, and to determine whether or not a release of regulated materials has occurred.

The scope of the investigation included reviewing historic file information available from the USDA Forest Service, sampling of waste and environmental media, and evaluating the site by use of the Hazard Ranking System (HRS). The objectives of this focused SI were to:

- Determine whether or not a CERCLA release has occurred or is suspected to have occurred.
- Confirm or deny the presence of contamination at the site.
- Determine the presence of a threat to human health or the environment.
- Evaluate the site pursuant to the HRS.

A Preliminary Assessment (PA) was completed on June 30, 1988, by the New Mexico Environmental Improvement Division (NMEID). The PA findings indicated that a spoils pile and heap leach pile from an inactive uranium mine were eroding and contaminating drainage pathways and possibly groundwater. NMEID recommended the USDA Forest Service conduct a screening SI at the site. The UNC San Mateo Mine was assigned the CERCLIS site number NM1223075575.

#### 2.0 SITE DESCRIPTION AND HISTORY

#### 2.1 Location

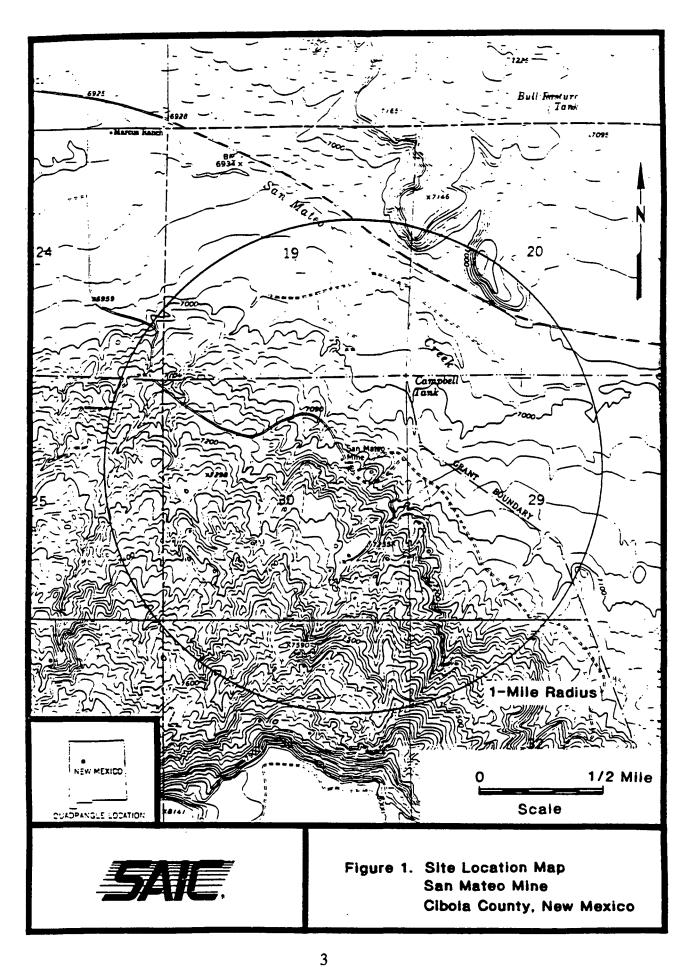
The UNC San Mateo Mine is an inactive uranium mine at the eastern edge of the Grants Mineral Belt of northwestern New Mexico. The mine is in Cibola County, New Mexico (Figure 1), on lands administered by the Mt. Taylor Ranger District of the Cibola National Forest. It is about 5.5 miles west of the town of San Mateo, New Mexico, in the NE¼, Section 30, Township 13 North, Range 8 West of the New Mexico Principal Meridian. The geographic coordinates are 35° 19' 41.5" N latitude and 107° 43' 13.0" W longitude. Access from Grants, New Mexico, is north on State Route 53/334 16 miles to the Marcus Ranch, then right on the Marcus Ranch dirt road 1.6 miles to the San Mateo Mine.

The climate is typical of the region, with extreme diurnal and seasonal temperature variations. Precipitation averages 12 inches per year, almost entirely as frequent, high-intensity, short-duration thunderstorms during the months from July through October. Several inches of snow may accumulate during winter storms.

#### 2.2 Nature of Site Activities

The original mining claims were filed in 1955. The San Mateo ore body was delineated by drilling in 1957. Initial development was by Rare Metals Corporation, with shaft sinking beginning in 1957 and completed in 1959. The first ore was shipped in 1959. Rare Metals Corporation (associated with El Paso Natural Gas Corporation) operated the mine from 1957 to 1962. El Paso Natural Gas Corporation assumed operations in 1962 until 1964.

Following production shutdowns due to mine water and shaft delays, the mine was sold to UNC, which operated the mine directly (from 1964 to 1971), and under various partnerships between UNC and its subsidiary Teton Exploration Corporation, Homestake Mining Company, and Sabre-Pinon partnership (from 1971 to 1979). In 1979, Homestake Mining



Company bought out UNC's share of the mine, and has controlled it since that time (McLemore, 1983).

Production continued sporadically until at least 1971, but minor exploration and assessment work continued to 1984. This work consisted primarily of removing existing structures and equipment, closing and sealing shafts, road repair, exploration drilling, and maintenance. In 1984, Homestake notified the USDA Forest Service of its intent to abandon all claims and cease all operations. However, Homestake has performed assessment work and maintained eight claims covering the mine area through the 1988 assessment year, and allowed all other claims to lapse through lack of assessment work (Raby, 1989). Since the mine closed in 1971, the main shaft and an emergency shaft have been sealed. The east air shaft has remained open, but with a protective cap installed at the surface.

The ore is at an average depth of 1,050 feet, with an average thickness of 8 feet. Initial estimates of reserves and grades were 2.2 million tons at 0.20% U<sub>3</sub>O<sub>8</sub> (Toole, 1959). The surface plant consisted of a headframe/hoist/ore bin structure, warehouse/change room/office building, machine shop/hoist power plant building, mine waste dump, settling ponds, and access roads.

Waste rock was disposed of at the mine head in a series of spoils terraces. Waste consisted of barren shale and sandstone and low grade mineralized rock. Of an estimated 642,000 cubic yards of material mined, about 100,000 yards of waste rock were deposited as surface waste (Raby, 1989). No ore was milled on site, but an on-site heap leach pad was constructed of waste rock with no apparent lining. The leach pad contains an estimated 13,000 cubic yards of waste material. Details of the leaching operation and chemical reagents used are unknown.

#### 2.3 Previous Investigations

The site was identified by EPA in 1983 (U.S. EPA, 1983), and was investigated by the NMEID in 1986 (NMEID, 1986), as part of regional studies. The PA was performed by

NMEID in 1988, but the site was not scored under the HRS. Samples collected and analyzed by the NMEID, mining companies, and other investigators indicated elevated levels of selenium, arsenic, molybdenum, lead, vanadium, uranium, and gross alpha and beta activity.

#### 2.4 Land Use and Regulatory Status

The entire site is on land reserved from the public domain, with land use limited by the lack of public access. The Marcus Ranch is the permittee for the grazing allotment that includes the mine site. Cattle graze throughout much of the site, and the area is used by big game hunters during hunting season, but the site receives very little recreational use beyond that.

Mining operations at the site began before the U.S. Atomic Energy Commission (AEC) regulated uranium mining and production, but the mine was licensed by the AEC pursuant to the Atomic Energy Act of 1954. The site is not listed on the National Priorities List (NPL). It does not fall under the authority of the Nuclear Regulatory Commission (NRC) pursuant to the Uranium Mill Tailings Radiation Control Act (UMTRCA), because it is not a uranium processing mill or depository site designated in the Act. No uranium milling was performed at the San Mateo site.

#### 3.0 OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

#### 3.1 Operational History

The San Mateo Mine was operated as a uranium mine between 1957 and 1971. The mining history is described under Section 2.1 of this report. The waste material is mine waste rock, which consists almost entirely of gray-green silty shale, which has been reduced to sand and smaller particle size. The waste contains soluble metals and radionuclides, including radium, thorium, radon, polonium, lead, vanadium, arsenic, selenium, molybdenum, barium, cadmium, mercury, and zinc (Rappaport, 1963).

#### 3.2 Field Screening and Sampling Program

On June 30 and July 1, 1993, SAIC conducted a field screening and sampling program at the San Mateo site. The site screening was conducted with a Victoreen GM Pancake Probe, calibrated against a Cs-137 check source just prior to field screening. The results of this field screening are shown on Figure 2. Because of the high readings on the preliminary scan (in excess of 2 MREM/hr), field activities were terminated in the tailings area by the on-site health and safety officer. Table 1 shows the sample location rationale.

#### 4.0 GROUNDWATER

#### 4.1 Hydrogeology

The bedrock formation at the surface of the site is Mancos Shale, which is overlain by alluvium and underlain by the Dakota Formation, which is predominantly sandstone. Shallow groundwater occurs within the alluvium and in the Mancos Shale, with deeper groundwater in sandstones of the Dakota Formation. The shallow alluvial aquifers flow generally west, roughly paralleling the flow in San Mateo Creek. The deeper groundwater flows toward the north. Because of mine dewatering and groundwater extraction for milling of ore, the deeper aquifer water level (Dakota Formation) has been lowered, and any intermixing of the two groundwater zones would be from the shallow into the deeper aquifer.

#### 4.2 Groundwater Use

Groundwater in the deeper aquifer has only been accessed by the uranium mining companies for process water requirements. The nearest domestic water user is the Marcus Ranch, located within 2 miles of the San Mateo Mine. The ranch uses surface water and shallow groundwater for domestic use and stock watering. The Town of San Mateo is about 5.5 miles up gradient from the mine site.

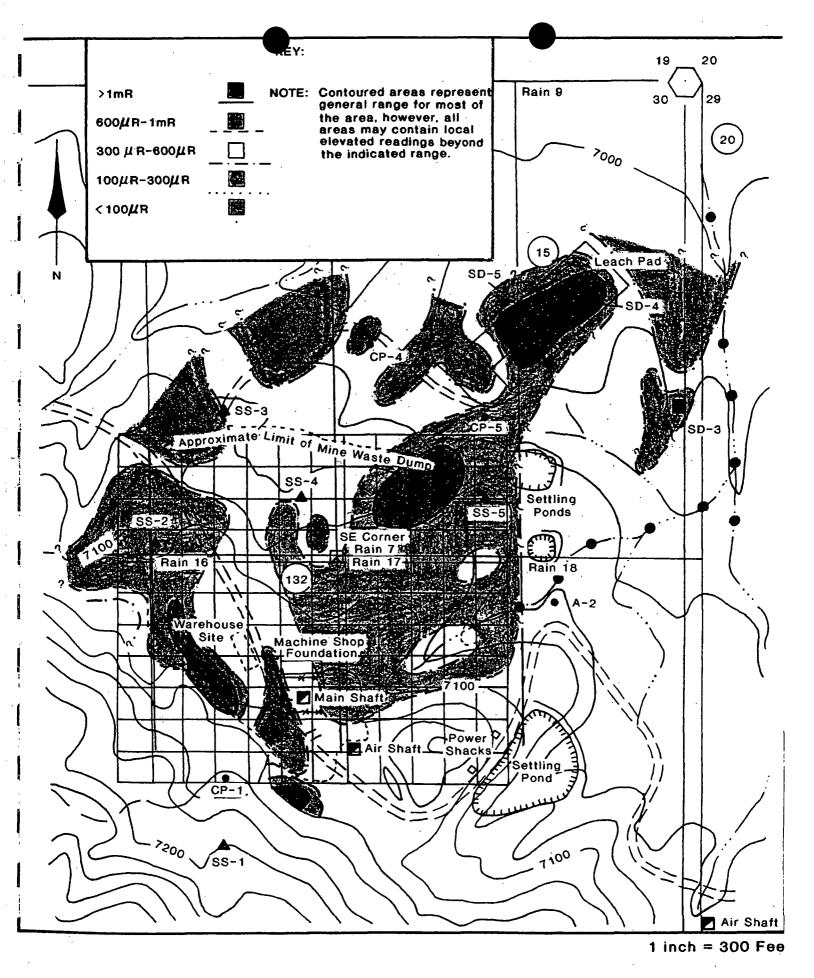


Figure 2. Approximate Screening Locations, San Mateo Mine Site

Table 1. Sampling Location Rationale

MEDIA	SAMPLE	LOCATION				
Source/	SS-1	Background soil sample				
Soil	SS-2 .	Tailings area sample				
	SS-3	Tailings area sample				
	SS-4	Tailings area sample				
	SS-5	Tailings area sample				
Ground-	GW-1	Lee well, upgradient of site				
water	GW-2	Marcus Ranch well, downgradient of site				
	GW-3	Red River well, downgradient of site				
Sediment SD-1		Arroyo upgradient of San Mateo Creek				
	SD-2	Arroyo downgradient of San Mateo Creek				
·	SD-3	Arroyo draining mine tailings area				
	SD-4	Heap leach pad area				
	SD-5	Heap leach pad area				
Air	AR-1	Upwind air sample				
	AR-2	Downwind air sample				
	AR-3	Downwind air sample				
QA/QC	DUP-1	Dupllicate sample				
	DUP-2	Duplicate sample				

Three existing groundwater supply wells were sampled by SAIC on June 30 and July 1, 1993. The samples were analyzed for parameters of concern, and the results are shown in Table 2. The groundwater sampling locations are shown on Figure 3. The wells were existing supply wells with pumps and piping installed, and the water levels could not be measured with great accuracy. No well construction details were available, so the depth and well diameter were measured in the field.

GW-1 was taken from the well at the Lee Ranch upgradient of the San Mateo Mine site, GW-2 from the well at the Marcus Ranch, and GW-3 from the Red Rock Ranch well. Details on the wells and sampling are provided on Table 3. Dismantling of the wells to verify well conditions was prohibited by the well owners. Because of the well construction at the Red Rock Ranch well, the field crew was unable to determine the well depth, water level, or casing diameter. No well construction details were available for the well. However, 904 gallons were purged prior to sampling, which was assumed to represent at least two casing volumes based on the construction of the other two wells. The well owners objected to purging because of the low yields, but after negotiations with the owners the field crew was allowed to purge GW-2 and GW-3 for not more than one hour.

#### 4.3 Groundwater Sampling

Samples were collected using the existing pumps in each well after purging the volumes indicated. Samples were collected into laboratory prepared sample bottles, preserved as appropriate to the analytical methods, labeled, and shipped to the analytical laboratory along with the completed chains-of-custody. Turbidity, conductivity, temperature, and pH were determined at the time of sampling, and the results are given in Table 3. The pH meter was calibrated against standard, and the turbidity meter checked against a 0.02 NTU check source. Analytical results are provided as Appendix A to this report. Only the results for GW-3 showed elevated levels of alpha activity (92±24 pCi/ℓ). Because of the well location the source of this activity could be naturally occurring radionuclides associated with the ore-bearing geologic formations. The Maximum Contaminant Level (MCL) for gross alpha (including Ra-226) is 15 pCi/ℓ. The selenium concentrations in GW-3 (0.39 mg/ℓ) also exceed the MCL of 0.01 mg/ℓ. No

Table 2. Summary of Chemical Analysis, San Mateo Mine Site

Sample		Radium(1)	Gross(1)	Gross(1)							
ID	Matrix	226	alpha	beta	As(2)	Ba(2)	Pb(2)	Mo(2)	Se(2)	Va(2)	U(3)
SS-1	Soil	0.55 ± 0.18	17 ± 14	28 ± 14	3.2	71.6	5.3	ND	ND	14.1	1.7
SS-2	Soil	121.3 ± 2.2	1027 ± 56	455 ± 25	6.6	90.9	13.4	95.3	8.8	70.5	180
SS-3	Soil	$31.0 \pm 1.0$	362 ± 35	172 ± 16	3.6	86.0	4.5	12.9	12.0	44.5	81
SS-4	Soil	83.6 ± 1.6	1724 ± 75	542 ± 31	19.9	46.8	10.8	885	142	71.2	360
SS-5	Soil	$28.3 \pm 0.7$	1476 ± 68	$649 \pm 31$	5.2	502	9.4	97.5	11.2	72.4	390
FB-1	Aqueous	$0.05 \pm 0.27$	0.2 ± 1.2	$0.2 \pm 3.3$	ND	ND	ND	ND	ND	ND	ND
SD-1	Soil	$0.61 \pm 0.17$	311 ± 34	123 ± 20	5.0	99.9	9.7	ND	ND	16.4	2.2
SD-2	Soil	$0.98 \pm 0.23$	9.8 ± 12	$2.0 \pm 13$	2.3	29.8	4.2	ND	ND	7.2	1.6
SD-3	Soil	18.78 ± 0.81	511 ± 130	$3390 \pm 93$	3.1	58.8	5.3	3.3	2.7	30.0	29
SD-4	Soil	$380.4 \pm 3.7$	2240 ± 130	$678 \pm 49$	3.5	130	11.5	7.3	28.9	94.9	150
SD-5	Soil	$148.6 \pm 2.2$	1041 ± 57	328 ± 24	4.1	230	24.2	30.8	22.0	288	2300
GW-1	Aqueous	$0.15 \pm 0.28$	$7.6 \pm 5.7$	$-1.2 \pm 7.1$	ND	0.15	ND	ND	ND	0.015	6.4
GW-2	Aqueous	$0.20 \pm 0.28$	6 ± 15	7 ± 29	ND	0.025	ND	ND	ND	ND	3.5
GW-3	Aqueous	$0.60 \pm 0.36$	92 ± 24	$29 \pm 27$	ND	ND	ND	ND	0.39	ND	76
DUP-1	Soil				2.1	55.1	37.8	5.4	2.5	20.7	
DUP-2	Soil			-	2.2	65.0	4.7	ND	ND	12.2	2.5

Units: (1)Radiochemistry in pCi/g for soil pCi/l for aqueous

(2)Metals in mg/kg for soil mg/l for aqueous

(3)Uranium in'g/g for soil mg/l for aqueous

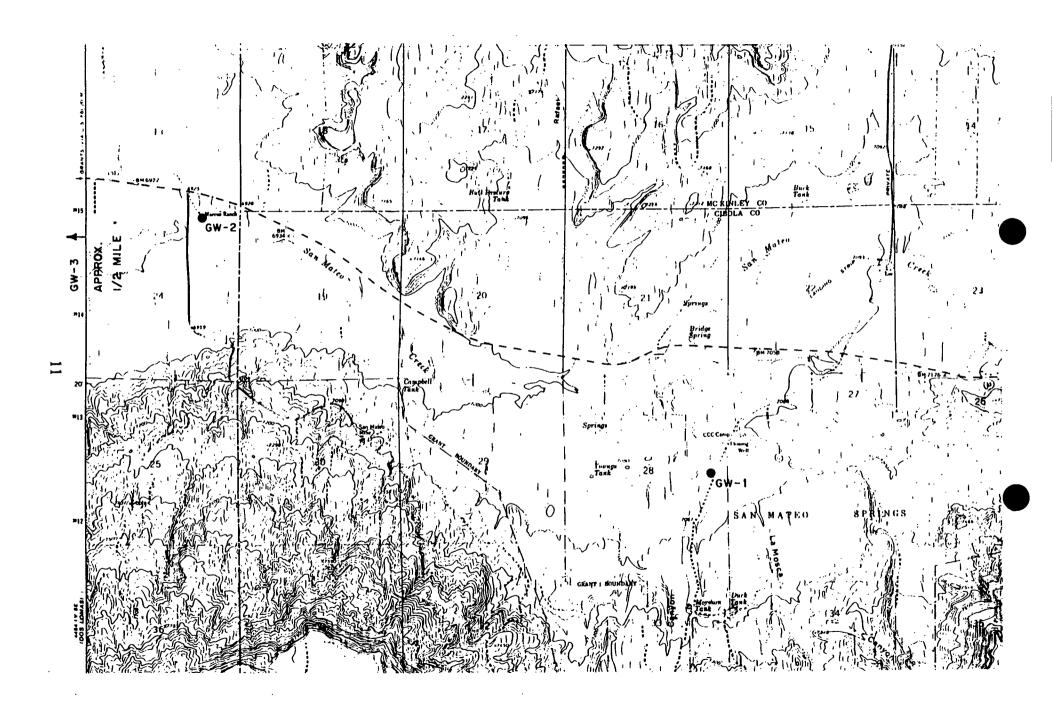


Figure 3. San Mateo Mine Site Groundwater Sample Locations

Table 3. Groundwater Field Parameters

Parameter	GW-1	GW-2	GW-3
Well Depth (ft)	37.0	210	see note
Static Water Level (ft bgs)	13.06	50	see note
Well Casing Diameter (in)	6.0	6	see note
Temperature (°F)	62.6	63.3	75.6
pН	7.6	7.73	7.76
Conductivity (µS/cm)	1040	2800	2870
Turbidity (NTU)	42.5	1.10	40
Casing Volumes Purged	2	4	see note (904 gal.)

Note: Due to the well construction, the depth, water level, and casing diameter of GW-3 could not be determined.

other groundwater contaminants were detected. GW-2 is the well nearest the San Mateo site.

#### 5.0 SURFACE WATER

#### 5.1 Hydrology

The San Mateo Mine site is on the northern flank of La Jara Mesa. Tributaries to San Mateo Creek drain portions of the mesa to the east and west of the mine site. San Mateo Creek is an ephemeral drainage that flows toward the west at about 36 feet per mile. The San Mateo Mine is about one mile south of San Mateo Creek, and drains north to the Creek. Several springs in the area also drain to San Mateo Creek. The site is not within a floodplain. No surface water sampling was performed, because there was no flow in the arroyos draining the site during the field investigation period.

#### 5.2 Surface Water Use

Although surface water provides stock water, no surface water intakes, fisheries, wetlands, or other sensitive environments have been identified in the area of the site or downstream from the site. Three groundwater wells were found on the south end of the heap leach pad. After removal of the casing caps they were found to be plugged at approximately 3 feet below the surface. They are believed to have supplied water for the heap leach process.

#### 5.3 Sediment Sampling

During the field investigation of June 30 and July 1, 1993, uranium ore was observed in the waste piles and on the surface of the site. There was also evidence of active erosion of the mine waste from the site into adjacent arroyos which drain into San Mateo Creek.

Stream sediment samples from the arroyos were collected and analyzed for contaminants of concern. The sampling locations are shown of Figure 4, and the results summarized on Table 2. Results from the analytical laboratory are included in Appendix A. These results indicate radioactivity above background levels in the sediments within these drainages, except for SD-2, which is just below the confluence with San Mateo Creek. SD-1, collected upgradient from the confluence, indicated elevated activity, and could indicate additional sources other than the San Mateo Mine. On the basis of this visual observation and the analytical results, it appears that a release of contaminants has occurred.

#### 6.0 SOIL

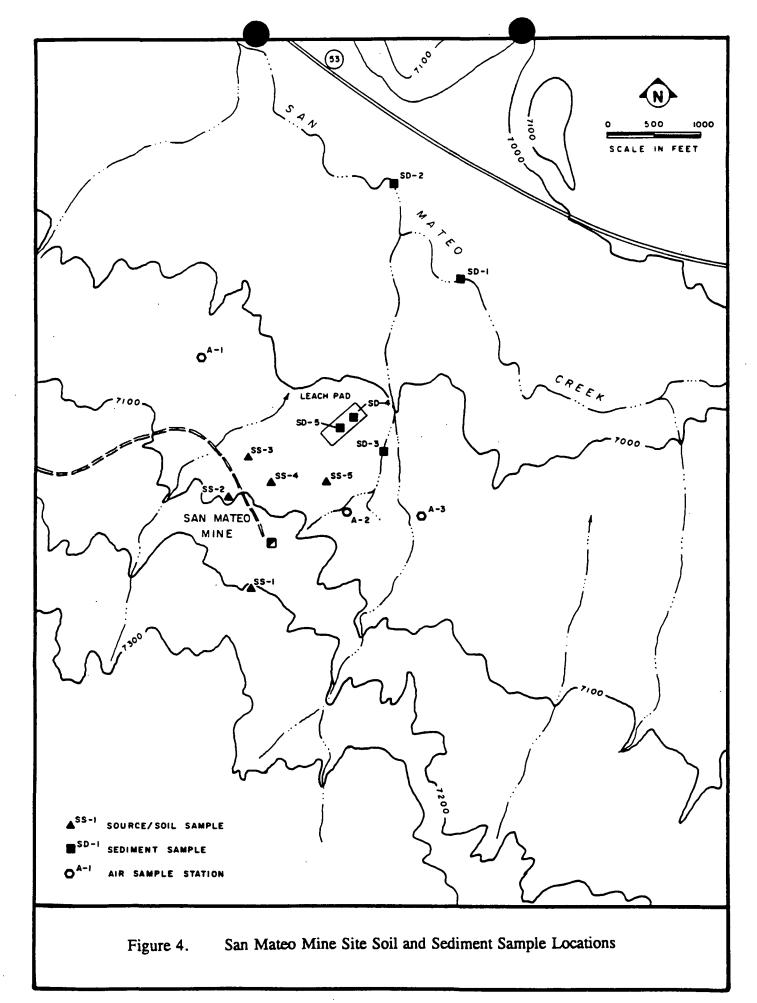
#### 6.1 Population and Potential Receptors

The site is inactive, and there is no resident population. The nearest residence is about 1.5 miles from the site, and no schools or day care centers are within miles of the site. The nearest town is San Mateo, which is about 5.5 miles from the site. The site is not readily accessible to the general population, although it may be visited by big game hunters during hunting season. No sensitive terrestrial environments have been identified. However, cattle graze the area and have access to the mine site. The mine waste pile has not been reclaimed, vegetated, or covered, and contaminated soils are vulnerable to wind and water erosion and subsequent transport.

The principal route of exposure from contaminated soil would be ingestion by cattle or wildlife. The field screening results (Figure 2) indicate soils with elevated concentrations of radionuclides are prevalent at the site.

#### **6.2** Sensitive Environments

No sensitive terrestrial environments have been identified.



#### 6.3 Soil Sampling

Soil sampling locations are shown on Figure 4. SS-1 was collected upgradient of the San Mateo Mine, and was intended to be a background soil sample. SS-2, SS-3, SS-4, and SS-5 were collected from around the general mining and tailings area. However, because of the relatively high radioactivity measured during the site screening, no samples of mine waste piles were collected. It was anticipated that any soil samples collected from the site would exceed allowable Department of Transportation activity for shipment.

The analytical results for the soil samples are in Appendix A. These results indicate radioactively contaminated soils over a broad area of the mine site.

#### 7.0 AIR

#### 7.1 Population and Potential Receptors

Although there may be risk of airborne contaminants, because of the lack of waste cover and exposure of the waste to wind, the population around the site is very sparse. The nearest residence is about 1.5 miles from the site, and the nearest town about 5.5 miles away. Because the site is inactive, there are no workers at the site, and no sensitive environments have been identified.

#### 7.2 Air Sampling

Three air samples were collected, but no contaminants were detected. The samples were collected at 10 liters per minute, using a high volume dual filter system. The samples were collected over 10 hours. AR-1 was on the upwind side of the site, and AR-2 and AR-3 on the downwind side of the site. AR-2 was collected downwind of the main tailings area. Analytical results of the air sampling are included in Appendix A, but no contaminants were detected. All results shown in the appendix are recorded as ND (non-detections). However, the wind velocity

was minimal during the sampling period, and airborne contaminant levels could be greater during high wind periods.

#### 8.0 SUMMARY AND CONCLUSIONS

The purpose of the SI was to:

- confirm or deny the presence of contamination at the site;
- determine whether or not a release of hazardous materials has occurred, or is suspected to have occurred;
- determine the presence of a threat to human health or the environment; and
- evaluate the site pursuant to the Hazard Ranking System (HRS).

Based on the field screening and analytical results, radioactive contamination is present at the site. Because the more soluble radionuclides are migrating offsite, the contamination poses a threat to human health and the environment. Determination of the degree of hazard and extent of contamination will require further study, but it appears that site restoration is warranted.

Because the site is an inactive uranium mine, the expected radionuclides are U-238, U-235, Th-232, and their progeny. Based on data from the National Council on Radiation Protection and Measurements (1987), the Th-232 activity will normally be up to five times the U-238 activity in shale sandstones (see Table 4). The U-235 activity will be about 5% of the U-238 activity. Tables 5 through 7 summarize the U-238, U-235, and Th-232 decay series. These radionuclides produce alpha, beta, and gamma radiation of 0.026 to 2.6 MeV, with the amount of each dependent on the relative ratios of the radionuclides and isotopes. It is important to note that uranium is the least soluble of these radionuclides, and the solubility increases as you go down the chain (as the atomic number decreases).

It is also important to note that under normal conditions the radionuclides/isotopes present are in equilibrium (i.e., have the same activity) up to radon. Radon, present in each chain, is an inert gas and may escape from the soil and migrate from the site before decaying. If it does

Table 4. Summary of Concentrations of Major Radionuclides in Major Rock Types and Soil\*

Rock Type	Potassium-40		Rubidium-87		Thorium-232		Uranium-238	
	Percent total potassium	Bq/kg <sup>b</sup>	ppm total rubidium	Bq/kg <sup>b</sup>	ppm	Bq/kg <sup>b,c</sup>	ppm	Bq/kg <sup>b,d</sup>
Igneous rocks			· ·					
Basalt (crustal average)	0.8	300	40	30	3-4	10-15	0.5-1	7-10
Mafic <sup>e</sup>	0.3-1.1	70-400	10-50	1-40	1.6,2.7	7,10	0.5,0.9	7,10
Salic <sup>d</sup>	4.5	1,100-1,500	170-200	150-180	16,20	60,80	3.9,4.7	- 50,60
Granite (crustal average)	>4	>1,000	170-200	150,180	17	70	3	40
Sedimentary rocks								
Shale sandstones:	2.7	800	120 <sup>r</sup>	110	12	50	3.7	40
Clean Quartz	<1	< 300	< 40 <sup>r</sup>	<40	<2	< 8	<1	< 10
Dirty Quartz	2?	400?	90?	80?	3-6?	10-25?	2-3?	40?
Arkose	2-3	600-900	80-120 <sup>f</sup>	80	2?	< 8	1-2?	10-25?
Beach sands (unconsolidated)	<1	< 300?	<40?	< 40?	6	25	3	40
Carbonate Rocks	0.3	70	10	8	2	8	2	25
Continental Upper Crust								
Average <sup>‡</sup>	2.8	850	112	100	10.7	44	2.8	36
Soilsh	1.5	400	65 <sup>r</sup>	50	9	37	1.8	66

From National Council on Radiation Protection and Measurements, 1987, p. 61

 $<sup>^{</sup>b}$  1 Bq = 27 pCi.

To obtain series equilibrium alpha, beta, or approximate gamma (excluding bremsstrahlung and x radiation) activity, multiply by 6, 4, or 3, respectively.

To obtain series equilibrium alpha, beta, or approximate gamma (excluding bremsstrahlung and x radiation) activity, multiply by 8, 6, or 3, respectively.

From Clark et al. (1966); for potassium and rubidium, the range of values for rocks within the class is given; for thorium and uranium, the median and mean values are given, respectively.

Estimated by application of crustal abundance ratio with respect to potassium.

From Taylor and McLennan (1985).

h In-situ gamma-spectral measurements at 200 locations by Lowder et al. (1964).

Table 5. Uranium Decay Series

Nuclide	Half-life	Major radiation energies (MeV) and Intensities					
		α	В	Gamma			
238 U 92 ↓	4.51 x 10 <sup>9</sup> y	4.15 (25%) 4.20 (75%)					
234 Th 90	<b>24.1d</b>		0.103 (21%) 0.193 (79%)	0.063c (3.5%) 0.093c (4%)			
234 <sub>Pa</sub> m 91 99.87%   0.13%	1.17m		2.29 (98%)	0.765 (0.30%) 1.001 (0.60%)			
234 <sub>Pa</sub> 91	6.75h		0.53 (66%) 1.13 (13%)	0.100 (50%) 0.70 (24%) 0.90 (70%)			
234 U 92	2.47 x 10 <sup>5</sup> y	4.72 (28%) 4.77 (72%)		0.053 (0.2%)			
230 Th 90	8.0 x 10 <sup>4</sup> y	4.62 (24%) 4.68 (76%)		0.068 (0.6%) 0.142 (0.07%)			
226 <sub>Ra</sub> 88	1602y	4.60 (6%) 4.78 (95%)		0.186 (4%)			
222 <sub>Rn</sub> 86	3.823d	5.49 (100%)		0.510 (0.07%)			
216 <sub>Po</sub> 84 99.98%   0.02%	3.05m	6.00 (~100%)	0.33 (~0.19%)				
214 Pb 82	26.8m		0.65 (50%) 0.71 (40%) 0.98 (6%)	0.295 (19%) 0.352 (36%)			
210 At 85	~2s	6.65 (6%) 6.70 (94%)	? (~0.1%)				
214 Bi 83	19.7m	5.45 (0.012%) 5.51 (0.008%)	1.0 (23%) 1.51 (40%) 3.26 (19%)	0.609 (47%) 1.120 (17%) 1.764 (17%)			

Table 5. Uranium Decay Series (Continued)

Nuclide	Half-life	Majo	or radiation energies (M and intensities	(MeV)		
}		α	α β			
99.98% ↓ 0.02% 214 Po 84	164µs	7.69 (100%)	••••	0.799 (0.014%)		
210 TI 81	1.3m		1.3 (25%) 1.9 (56%) 2.3 (19%)	0.296 (80%) 0.795 (100%) 1.31 (21%)		
210 <sub>Pb</sub> 82	<b>2</b> 1y	3.72 (.000002%)	0.016 (85%) 0.061 (15%)	0.047 (4%)		
210 <sub>Bi</sub>	5.0ld	4.65 (.00007%) 4.69 (.00005%)	1.161 (~100%)			
-100%   .00013% V 210 Po 84	138.4d	5.305 (100%)	•	0.803 (.0011%)		
206 TI 81	4.19m		1.571 (100%)			
↓ 204 <sub>Pb</sub> 82	Stable					

Table 6. Actinium Decay Series

Nuclide	Half-life	Major radiation energies (MeV) and intensities					
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		· a	В	Gamma			
235 <sub>U</sub> 92	7.1 x 10 <sup>8</sup> y	4.37 (18%) 4.40 (57%) 4.58c (8%)		0.143 (11%) 0.185 (54%) 0.204 (5%)			
231 Th 90 Th	25.5h		0.140 (45%) 0.220 (15%) 0.305 (40%)	0.026 (2%) 0.084c (10%)			
231 Pa 91	3.25 x 10 <sup>4</sup> y	4.95 (22%) 5.01 (24%) 5.02 (23%)		0.027 (6%) 0.084c (6%)			
227 Ac 89 1 1.4%	21.6y	4.86c (0.18%) 4.95c (1.2%)	0.043 (~99%)	0.070 (0.08%)			
227 Th 90	18.2d	5.76 (21%) 5.98 (24%) 6.04 (23%)		0.050 (8%) 0.237c (15%) 0.31c (8%)			
223 Fr 87	<b>22</b> m	5.44 (~0.005%)	1.15 (~100%)	0.050 (40%) 0.080 (13%) 0.234 (4%)			
223 Ra 86 Ha	11.43d	5.61 (26%) 5.71 (54%) 5.75 (9%)		0.149c (10%) 0.270 (10%) 0.33c (6%)			
219 Rn 86	4.0s	6.42 (8%) 6.55 (11%) 6.82 (81%)		0.272 (9%) 0.401 (5%)			
215 Po 64 ~100%   .00023%	1.78ms	7.38 (~100%)	0.74 (~.00023%)				
211 <sub>Pb</sub> 82	36.1m		0.29 (1.4%) 0.56 (9.4%) 1.39 (87.5%)	0.405 (3.4%) 0.427 (1.8%) 0.832 (3.4%)			
215 At 85	~0.1ms	8.01 (~100%)					
211 Bi 83 0.28%   99.7%	2.15m	6.28 (16%) 6.62 (84%)	0.60 (0.28%)	0.351 (14%)			
211 <sub>Po</sub> 84	0.52s	7.45 (99%)		0.570 (0.5%) 0.90 (0.5%)			
209 TI 81	4.79m		1.44 (99.8%)	0.897 (0.16%)			
207 Pb 82 Pb	Stable						

Table 7. Thorium Decay Series

Nuclide	Half-life	Majo	Major radiation energies (MeV) and intensities					
		α .	В	Gamma				
232 <sub>Th</sub> 90	1.41 x 10 <sup>10</sup> y	3.95 (24%) 4.01 (76%)						
228 Ra 88 I	6.7y		0.055 (100%)					
228 89 Ac	. 6.13h		1.18 (35%) 1.75 (12%) 2.09 (12%)	0.34c (15%) 0.908 (25%) 0.96c (20%)				
228 <sub>Th</sub> 90 ↓	1.910y	5.34 (28%) 5.43 (71%)		0.084 (1.6%) 0.214 (0.3%)				
224 Ra 88	3.64d	5.45 (6%) 5.68 (94%)		0.241 (3.7%)				
220 Rn 86	55s	6.29 (100%)		0.55 (0.07%)				
216 <sub>Po</sub> 84	0.15s	6.78 (100%)						
213 <sub>Pb</sub> 82 ↓	10.64h		0.346 (81%) 0.586 (14%)	0.239 (47%) 0.300 (3.2%)				
213 Bi 64.0% 36.0%	60.6m	6.05 (25%) 6.09 (10%)	1.55 (5%) 2.26 (55%)	0.040 (2%) 0.727 (7%) 1.620 (1.8%)				
213 <sub>Po</sub> 84	304ns	8.78 (100%)						
208 TI 81	3.10m		1.28 (25%) 1.52 (21%) 1.80 (50%)	0.511 (23%) 0.583 (86%) 0.860 (12%) 2.614 (100%)				
208 Pb 82	Stable		*****					

not escape it will contribute to the observed activity and may approach equilibrium (i.e., have the same activity as the parent element).

Table 2 summarizes the analytical results for the samples collected. The water samples were collected from existing wells in the vicinity, and well construction data is lacking. The radioactivity in these samples may be associated with the naturally occurring ore body (particularly in the case of GW-3). With the limited information on the well construction, no specific conclusion can be drawn concerning a source.

The soil data clearly show the presence of ore at the surface. It is clear, with all of the alpha and beta emitters present, that the entire activity is not in equilibrium, based on uranium activity. A general radiation survey was made with a Victoreen micro-R meter calibrated using Cs-137 (about 0.66 MeV). For the energy range of the radionuclides/isotopes of concern (0.026 to 2.6 MeV), this survey instrument will only be accurate within a factor of 2. The survey data is shown on Figure 2, which indicates the measurement of ambient gamma radiation in micro-R per hour (1 X 10<sup>-3</sup> mR/yr). The natural background in the U.S. typically ranges from 40 to 125 mR/yr, which is 4.5 to 14 micro-R per hour. Because the site is at an elevation of about 7,000 feet, background is probably in the range of 10 to 14 micro-R per hour. Figure 2 shows the activity at the site to be well above this range.

Table 8 summarizes the soil activity data from Figure 2 as a function of the uranium activity. This function should be constant, unless the daughter products are being transported away from the original source. The general data appear to be above background for all points except SS-1 and SD-2. The high progeny activities at SD-1 and SD-3 seem to indicate that the more soluble progeny are being moved away from the parent radionuclides/isotopes sources. SD-1 was collected in the area of the confluence of San Mateo Creek and the arroyo draining the site. The field team observed evidence of active erosion of the mine tailings into the arroyo at the SD-3 location. The high radium activity at SD-4 and the high uranium activity at SD-5 indicate that the more soluble isotopes, such as radium, are migrating downgradient. SD-4 and SD-5 were collected from the leach pad area. There also seems to be some lack of correlation

Table 8. Activity As A Function of Uranium Activity

Location	ID	Dose Rate	Activity/Uranium Activity			U pCi/g	Status*
		μR/hr	Ra	α	В		
General Area	SS-1	< 0.1	0.3 ± 0.1	10 ± 8	16 ± 8	1.7	NE
General Area	SS-2	0.6 - 1.	0.7 ± 0.01	6 ± 0.1	2.5 ± 0.1	180	NE
General Area	SS-3	0.1 - 0.3	0.4 ± 0.01	4.5 ± 0.4	2.1 ± 0.2	81	NE
General Area	SS-4	0.3 - 0.6	0.2 ± 0.004	5. ± 0.2	1.5 ± 0.8	360	NE
General Area	SS-5	0.1 - 1.	.07 ± .002	3.9 ± 0.2	1.7 ± .08	390	NE
San Mateo Creek (S)	SD-1	NA*	0.3 ± .008	140 ± 15	56 ± 9	2.2	НР
San Mateo Creek (N)	SD-2	NA.	0.6 ± 0.14	6. ± 7.5 .	1.3 ± 8	1.6	NE
General Area	SD-3	0.6 - 1.	0.6 ± 0.03	18 ± 4.5	120 ± 3.2	29	НР
Leach Pad (N)	SD-4	>1	2.5 ± 0.02	15 ± 0.9	4.5 ± 0.3	150	HR
Leach Pad (S)	SD-5	>1	0.06 ± .001	0.45 ± .02	0.14 ± .01	2300	HU

Status:

NE=Near Equilibrium

HR=High Radium
NA=Not Available

HP=High Progeny Activity N=North HU=High Uranium

S = South

of the dose rate to uranium activity, particularly at SD-3, which indicates the sample at that location may not have been representative of the area sampled.

Two duplicate samples were collected to assess the data reproducibility. The first duplicate (DUP-1) was collected at the site of SD-3. The data compare reasonably well except for lead, which was higher in the duplicate. DUP-2 was collected at the site of SS-1, and the two analytical results compare fairly well. Because of the heterogeneities in the mine waste rock at the site, these probably represent good reproducibility in the data.

From this data, it appears that the material is being transported off-site in the surface runoff. However, further surveying and sampling will be needed to verify this, especially for San Mateo Creek. The San Mateo Creek contamination could be from this site or another source, although it appears that radionuclides are eroding into San Mateo Creek from the site.

To evaluate the significance of the contamination at the site, the activity can be compared to the EPA action level of 2 X 10<sup>-4</sup> cancer risk for individuals who access the site. Assuming an individual spends 40 hours per year at the site and using a dose rate of 0.5 mR/hr, an annual dose rate would be 20 mR/yr. Exposure to this dose rate over a period of nine years (the average U.S. time of residence at a location) results in 180 mR over the 9 years. Based on BEIR IV and V and the National Institute of Health Cancer data, a reasonable estimate of cancer risk from radiation is 6 X 10<sup>-7</sup> cancers per mR. This means the 180 mR would result in 1 X 10<sup>-4</sup> cancers over the 9 years. This does not include doses from inhalation and ingestion, which would raise the number higher. It does also not include exposure periods for more than 40 hours per year. Based on these figures, exposure of more than 80 hours per year would exceed the EPA action level.

Radium in the soil is not included in the Toxicity Characterization Leaching Procedure (TCLP) Rule. The drinking water MCL is 15 pCi/ $\ell$  gross alpha, including Ra-226. This MCL is exceeded in GW-3, but this could be from naturally occurring deposits in the aquifer.

The site was evaluated by the HRS using EPA's PASCORE software. The score sheets and site assessment forms are presented as Appendix B to this report. The site did not attain a sufficiently high score to be recommended for inclusion on the NPL. The necessary score for listing is 28.5, whereas the UNC San Mateo Mine site scored a 4. The low score was principally due to the absence of targets, even though a release was indicated by the field inspection and analytical results.

Because of the low HRS score, the site does not require an RI/FS. However, because relatively high alpha, beta and gamma activity is present on the site, and these contaminants are migrating from the site, site restoration should be undertaken. This should include actions to contain the waste rock on site, and reduce gamma radiation emissions at the surface of the site. These measures are needed to protect human health and the environment, and for good land management practice.

In summary, the results of this screening SI indicate the following:

- Radioactive contamination is present at the site;
- A surface release of radioactive contamination appears to have occurred;
- Because of the sparse population in the area of the site, there appears to be no imminent hazard to human health, although a threat to human health and the environment exists; and
- The site will not attain an HRS score of 28.5, due to the lack of targets.

#### 9.0 REFERENCES

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#### ANALYTICAL RESULTS

FOR

## SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

ENSECO-RMAL NO. 030088

**AUGUST 6, 1993** 

Reviewed by:

Nancy Voiland-Dow

SAIC Project: San Mateo Initial Site Investigation

Enseco Incorporated 4955 Yarrow Street Arvada, Colorado 80002 303/421-6611 Fax: 303/431-7171



#### I. OVERVIEW

On July 7, 1993, Enseco-Rocky Mountain Analytical Laboratory received twelve soil samples and four aqueous samples from Science Applications International Corporation (SAIC). As directed by Mike Brazie of SAIC on July 9, 1993, all of the radium-228 and hardness analyses requested on the Chain of Custody were cancelled. The gross alpha, gross beta and uranium were reported under Rocky Mountain Analytical Laboratory project number 030081. Trip blanks were provided with the samples, but were not necessary for radiochemical analyses. Therefore, they were not analyzed.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- I. Overview
- II. Sample Description Information/Analytical Test Requests
- III. Analytical Results
- IV. Quality Control Report

#### DISCUSSION

A reagent blank is analyzed with all radiochemistry parameters and must be within established control limits. The results for radium-226 are calculated by subtracting the method blank and/or the cell background.

Radiochemical measurements are reported along with an associated statistical counting uncertainty at the 95 percent confidence interval (2 sigma uncertainty). It should be understood by the user of these data that this uncertainty is due to the nature of random nuclear decay processes only. Counting uncertainty does not include the propagation of other sources of measurement uncertainty (total uncertainty). Total uncertainties are not generally used in the radiochemistry industry in reporting results or as the basis for minimum detectable concentration (MDC) calculations.



#### II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

#### Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

#### Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.



# SAMPLE DESCRIPTION INFORMATION for Science Applications International Corporation

		•			Sam	ple	ed	Red	eive	ed
Lab ID	Clien	t ID	Matrix	-	Date	•	Time	[	)ate	
030088-0001-SA 030088-0002-SA 030088-0003-SA 030088-0004-SA 030088-0005-SA 030088-0006-FB 030088-0007-SA 030088-0009-SA 030088-0010-SA 030088-0011-SA	SS-1 SS-2 SS-3 SS-4 SS-5 FB-1 SD-3 SD-1 SD-2 SD-4 SD-5	SAN MATEO MINE ARROYO SAN MATEO CREEK SAN MATEO CREEK LEACH PAD LEACH PAD	SOIL SOIL SOIL SOIL AQUEOUS SOIL SOIL SOIL	01 02 02 02 02 01 01 01 02	30F 30F 30F 30F 30F 30F 30F 30F	93 93 93 93 93 93 93 93 93	17:50 09:00 09:15 09:30 09:45 13:15 16:10 16:00 11:20	07 07 07 07 07 07 07 07	JUL JUL JUL JUL JUL JUL JUL JUL	93 93 93 93 93 93 93 93 93 93 93
030088-0012-SA	GW-2	MARCUS WELL	AQUEOUS	01	JUL		10:30		JUL	-
030088-0013-SA	GW-3	RED ROCK WELL	AQUEOUS	01			11:40		JUL	
030088-0014-SA	GW-1	LEE WELL	AQUEOUS	02	JUL	93	14:00	U/	JUL	73



# ANALYTICAL TEST REQUESTS for Science Applications International Corporation

Lab ID: 030088	Group Code	Analysis Description		
0001 - 0005,	Α	Radium-226 in soil/ Radon De-emanation	N	
0007 - 0011		Prep - Radium-226 in soil/ Radon De-emanation	N	
0006 , 0012,	В	Radium-226 in water/ Radon De-emanation	N	
0013 - 0014		Prep - Radium-226 in water/ Radon De-emanation	N	

#### III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL does not routinely blank-correct analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.5, May, 1992.



Client Name: Science Applications International Corporation Client ID: SS-1 SAN MATEO MINE Lab ID: 030088-0001-SA

SOIL Matrix:

Received: 07 JUL 93 Sampled: 01 JUL 93 08 JUL 93 Authorized:

Analytical Analyzed +/- 2 Sigma Result Uncertainty Method Date Units Parameter

27 JUL 93 EPA Ra-01 5.5E-1 +/-1.8E-1 pCi/g Radium-226

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SS-2 SAN MATEO MINE Lab ID: 030088-0002-SA

Matrix:

SOIL 08 JUL 93 Authorized:

Sampled: 02 JUL 93

Received: 07 JUL 93

+/- 2 Sigma Analytical Analyzed Result Uncertainty Method Date Parameter Units

27 JUL 93 EPA Ra-01 Radium-226 1.213E+2 +/-2.2E+0 pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SS-3 SAN MATEO MINE Lab ID: 030088-0003-SA

SOIL 08 JUL 93 Matrix: Authorized:

Sampled: 02 JUL 93

Received: 07 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

28 JUL 93 EPA Ra-01 Radium-226 3.10E+1 +/-1.0E+0pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SS-4 SAN MATEO MINE Lab ID: 030088-0004-SA

Matrix: SOIL Authorized: 08 JUL 93

Sampled: 02 JUL 93

Received: 07 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

28 JUL 93 EPA Ra-01 Radium-226 8.36E+1 +/-1.6pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SS-5 SAN MATEO MINE Lab ID: 030088-0005-SA

Matrix:

SOIL 08 JUL 93 Authorized:

Sampled: 02 JUL 93

Received: 07 JUL 93

Analytical Method +/- 2 Sigma Result Uncertainty Analyzed Units Date Parameter

28 JUL 93 EPA Ra-01 Radium-226 2.831E+1 +/-7.0E-1 pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: FB-1 SAN MATEO MINE Lab ID: 030088-0006-FB

Matrix:

AQUEOUS 08 JUL 93 Received: 07 JUL 93 Sampled: 02 JUL 93 Authorized:

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

EPA 903.1 29 JUL 93 Radium-226 5E-2 +/-2.7E-1pCi/L

Reported By: Mark Stella Approved By: Terry McKibbin



Client Name: Science Applications International Corporation Client ID: SD-3 ARROYO Lab ID: 030088-0007-SA

Matrix: SOIL Authorized: 08 JUL 93 Sampled: 01 JUL 93

Received: 07 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

pCi/g EPA Ra-01 28 JUL 93 Radium-226 1.878E+1 +/-8.1E-1

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SD-1 SAN MATEO CREEK Lab ID: 030088-0008-SA Matrix: SOIL

Received: 07 JUL 93 Authorized: 08 JUL 93 Sampled: 01 JUL 93

Analytical Method +/- 2 Sigma Result Uncertainty Analyzed Parameter Date Units

28 JUL 93 EPA Ra-01 Radium-226 6.1E-1 +/-1.7E-1pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SD-2 SAN MATEO CREEK Lab ID: 030088-0009-SA

Client ID: Lab ID: Matrix:

Matrix: SOIL Authorized: 08 JUL 93 Received: 07 JUL 93 Sampled: 01 JUL 93

Analyzed Date Analytical Method +/- 2 Sigma Result Uncertainty Parameter Units

28 JUL 93 Radium-226 EPA Ra-01 9.8E-1 +/-2.3E-1pCi/g

Reported By: Mark Stella Approved By: Terry McKibbin



Client Name: Science Applications International Corporation Client ID: SD-4 LEACH PAD

Lab ID: Matrix: 030088-0010-SA

SOIL

Received: 07 JUL 93 Authorized: 08 JUL 93 Sampled: 02 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma
Result Uncertainty Parameter Units

Radium-226 EPA Ra-01 29 JUL 93 3.804E+2 +/-3.7E+0pCi/g

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: SD-5 LEACH PAD Lab ID: 030088-0011-SA

Matrix: SOIL

Received: 07 JUL 93 Authorized: 08 JUL 93 Sampled: 02 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

EPA Ra-01 29 JUL 93 Radium-226 pCi/g 1.486E+2 +/-2.2E+0

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: GW-2 MARCUS WELL

030088-0012-SA Lab ID:

Matrix: AQUEOUS Authorized: 08 JUL 93

Received: 07 JUL 93 Sampled: 01 JUL 93

Analytical Method Analyzed Date +/- 2 Sigma Result Uncertainty Parameter Units

EPA 903.1 29 JUL 93 Radium-226 2.0E-1 +/-2.8E-1pCi/L

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: GW-3 RED ROCK WELL Lab ID: 030088-0013-SA Matrix: AQUEOUS Authorized: 08 JUL 93 Sampled: 01 JUL 93

Received: 07 JUL 93

Analytical Method Analyzed Date +/~ 2 Sigma Result Uncertainty Units Parameter

29 JUL 93 EPA 903.1 pCi/L Radium-226 6.0E-1 +/-3.6E-1

Reported By: Mark Stella



Client Name: Science Applications International Corporation Client ID: GW-1 LEE WELL Lab ID: 030088-0014-SA

**AQUEOUS** Matrix:

Received: 07 JUL 93 Authorized: 08 JUL 93 Sampled: 02 JUL 93

Analytical Method Analyzed +/- 2 Sigma Result Uncertainty Parameter Date Units

EPA 903.1 29 JUL 93 Radium-226 1.5E-1 + /-2.8E-1pCi/L

Reported By: Mark Stella



#### IV. QUALITY CONTROL REPORT

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

Accuracy for DCS and SCS is measured by Percent Recovery.

Precision for DCS is measured by Relative Percent Difference (RPD).

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.



## QC LOT ASSIGNMENT REPORT Radiochemistry

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
030088-0001-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0002-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0003-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0004-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0005-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0006-FB	AQUEOUS	RA226-A	09 JUL 93-9A	•
030088-0007-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0008-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0009-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0010-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0011-SA	SOLID	RA226-S	13 JUL 93-9A	-
030088-0012-SA	AQUEOUS	RA226-A	09 JUL 93-9A	-
030088-0013-SA	AQUEOUS	RA226-A	09 JUL 93-9A	-
030088-0014-SA	AQUEOUS	RA226-A	09 JUL 93-9A	-

#### RADIOCHEMISTRY QUALITY CONTROL REPORT

Parameter: Ra-226

QC Lot # 09-Jul-93 -9A

Units: pCi/g
Matrix: AQUEOUS

#### **DUPLICATE CONTROL SAMPLE REPORT**

SAMPLE	Activity +/- 2 s units	Spike Activity +/- 2 s units
DCS1	5.21E+01 +/- 1.0E+00 pCi/g	5.83E+01 +/- 3.2E+00 pCi/g
DCS2	6.14E+01 +/- 9.8E-01 pCi/g	5.83E+01 +/- 3.2E+00 pCi/g

Duplicate Control Sample # 1						
Analyte	Activity +/- 2 sigma	Spike Activity	Accuracy (%)	Activity +/- 2 sigma	Spike Activity	Accuracy (%)
Ra-226	5.21E+01 +/- 1.0E+00 pCi/g	5.83E+01 pCi/g	89%	6.14E+01 +/- 9.8E-01 pCi/g	5.83E+01 pCi/g	105%

#### **DUPLICATE CONTROL SAMPLE REPORT**

Ассигасу		DCS Precision (RPD)		
Mean %	Limits	RPD	Limits	
************	***************************************			
97%	70-130	16%	20%	

### RADIOCHEMISTRY QUALITY CONTROL REPORT

Parameter: Radium 226

QC Lot # 13-JUL-93 -9A

Units: pCi/g Matrix: SOLID

#### **DUPLICATE CONTROL SAMPLE REPORT**

SAMPLE	Activity +/- 2 s units	Spike Activity +/- 2 s units
DCS1	5.20E+01 +/- 1.5E+00 pCi/g	5.83E+01 +/- 3.2E+00 pCi/g
DCS2	5.42E+01 +/- 1.6E+00 pCi/g	5.83E+01 +/- 3.2E+00 pCi/g

	Duplicate Control Sample # 1			Duplicate Control Sample # 2				
Analyte	Activity +/- 2 sigma	Spike Activity	Accuracy (%)	Activity +/- 2 sigma	Spike Activity	Accuracy (%)		
Radium 226	5.20E+01 +/- 1.5E+00 pCi/g	5.83E+01 pCi/g	89%	5.42E+01 +/- 1.6E+00 pCi/g	5.83E+01 pCi/g	93%		

#### **DUPLICATE CONTROL SAMPLE REPORT**

	Ассигасу	DCS Pre	cision (RPD)
Mean %	Limits	RPD	Limits
91%	70-130	4%	20%

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2709-D Pan American Freeway NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 307308

August 3, 1993

SAIC 122 Longview Drive Los Alamos, NM 87544

Project Name/Number: SAN MATEO MINE 01-0209-01-1330-030

Attention: Stephen K. Stellavato

On 07/02/93, Analytical Technologies, Inc. received a request to analyze non-aqueous samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

We were unable to run matrix spikes and duplicates due to limited sample available. A laboratory control standard for metals, and blank spikes and duplicates for Radiochemistry are being reported instead.

For the radiochemistry analyses, the samples were based on pCi/L of air. Air volumes (sample duration x flow rate) were provided by the client. The filters were digested in HNO3, brought to 100 mL, and then separated into two fractions (one for Uranium and one for Gross Alpha/Beta and Radium $^{226}$ ). Therefore, each sample is fifty percent of the total sample.

The blank spike and Duplicate for Radium<sup>226</sup> were not spiked with Radium<sup>226</sup>, but with Cs<sup>137</sup> since the samples were also counted for Gross Alpha/Beta, and Cs<sup>137</sup> is part of the blank spike for Alpha/Beta. The blank spike and duplicate results for Cs<sup>137</sup> by Gamma Spectroscopy were satisfactory in accuracy and precision for the analysis.

All analyses were performed by ATI, Fort Collins.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

Adela M. Cantu

Senior Organic Chemist

Idela M Canta-

Letitia Krakowski

Acting Laboratory Manager

ptitu laslosdii

GJ:td

Enclosure

Corporate Offices: 5550 Morenouse Drive San Diego, CA 92121 (619) 458-9141



CLIENT

: SAIC

DATE RECEIVED: 07/02/93

PROJECT # : 01-0209-01-1330-030

PROJECT NAME: SAN MATEO MINE

REPORT DATE : 08/03/93

ATI I.D.: 307308

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	AR-1A/1B	PA-NON	06/30/93
02	AR-2A/2B	QA-NON	07/01/93
03	AR-3A/3B	QA-NON	07/01/93

----TOTALS----

MATRIX # SAMPLES NON-AQ 3

## ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from t. date of this report. If an extended storage period is required, please conta our sample control department before the scheduled disposal date.



Sample ID

307308-1

Lab Name: Analytical Technologies, Inc.

Client Name: Analytical Technologies, Inc.

Date Collected: 06/30/93

Client Project ID: SAIC - 307308

Prep Date: 07/09/93

Lab Sample ID: 93-07-033-01

Date Analyzed: 07/13,14,19/93

Sample Matrix: Air Filter

Analyte	Method	Concentration (mg/filter)	Detection Limit (mg/filter)
Ai-	7060	NTO	0.0005
Arsenic	7060	ND	1
Barium	6010	ND	0.001
Lead	7421	ND	0.0003
Molybdenum	6010	ND	0.001
Selenium	7740	ND	0.0005
Vanadium	6010	ND	0.001



Sample ID

307308-2

Lab Name: Analytical Technologies, Inc.

Client Name: Analytical Technologies, Inc.

Date Collected: 07/01/93

Client Project ID: SAIC - 307308

Prep Date: 07/09/93

Lab Sample ID: 93-07-033-02

Date Analyzed: 07/13,14,19/93

Sample Matrix: Air Filter

Analyte	Method	Concentration (mg/filter)	Detection Limit (mg/filter)
Arsenic	7060	ND	0.0005
Barium	6010	ND	0.001
Lead	7421	ND	0.0003
Molybdenum	6010	ND	0.001
Selenium	7740	ND	0.0005
Vanadium	6010	ND	0.001



Sample ID

307308-3

Lab Name: Analytical Technologies, Inc.

Client Name: Analytical Technologies, Inc.

Date Collected: 07/01/93

Client Project ID: SAIC -- 307308

Prep Date: 07/09/93

Lab Sample ID: 93-07-033-03

Date Analyzed: 07/13,14,19/93

Sample Matrix: Air Filter

Analyte	Method	Concentration (mg/filter)	Detection Limit (mg/filter)
Arsenic	7060	ND	0.0005
Barium	6010	ND	0.001
Lead	7421	ND	0.0003
Molybdenum	6010	ND	0.001
Selenium	7740	ND	0.0005
Vanadium	6010	ND	0.001



Sample ID

Reagent Blank

Lab Name: Analytical Technologies, Inc.

Client Name: Analytical Technologies, Inc.

Date Collected: N/A

Client Project ID: SAIC - 307308

Prep Date: 07/09/93

Lab Sample ID: RB 93-07-033

Date Analyzed: 07/13,14,19/93

Sample Matrix: Air Filter

Analyte	Method	Concentration (mg/filter)	Detection Limit (mg/filter)
Arsenic	7060	ND	0.0005
Barium	6010	ND	0.001
Lead	7421	ND	0.0003
Molybdenum	6010	ND	0.001
Selenium	7740	ND	0.0005
Vanadium	6010	ND	0.001

Lab Name: Analytical Technologies, Inc.

Client Name: Analytical Technologies, Inc.

Prep Date: 07/09/93

Client Project ID: SAIC -- 307308

Date Analyzed: 07/13,14,19/93

Analyte	LCS Result (mg/L)	LCS True Value (mg/L)	LCS % Recovery
Arsenic	0.037	0.040	92.5
Barium	1.04	1.00	104
Lead	0.040	0.040	100
Molybdenum	1.01	1.00	101
Selenium	0.035	. 0.040	88
Vanadium	0.99	1.00	99



#### ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310

Lab Name: Analytical Technologies, Inc. Date Collected: 06/30/93 21:00

Client Name: ATI-NM

Date Analyzed : 07/29/93 12:02

Client Project ID: SAIC -- 307308

Sample Matrix : Water

Lab Sample ID Series: 93-07-033

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
307308-1	07-033-01	< 0.34 (BDL)	< 1.05(BDL)
307308-2	07-033-02	< 0.34 (BDL)	< 1.05(BDL)
307308-3	07-033-03	< 0.34 (BDL)	< 1.04(BDL)
Blank	07-033-B1	< 1.73 (BDL)	2.37 ± 3.28

BDL = Below Detection Limit; see method for DL determination Remarks:

Units are pCi/liter of air.



#### GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310

Lab Name: Analytical Technologies, Inc.

Date Collected: 07/20/93

Client Name: ATI-NM

Date Analyzed: 07/29/93

Client Project ID : SAIC -- 307308

Sample Matrix : Water

Lab Workorder Number: 93-07-033

Units : liter

Lab Sample ID	Gross Alpha	Gross Alpha	Gross Beta	Gross Beta
	Known Value	Rep't Value	Known Value	Rep't Value
	1028.0 ±442.0 1028.0 ±442.0			

Reported Uncertainties are at the 95 % Confidence Interval

The U.S. EPA sets control limits for gross alpha measurements as follows : Control Limits = Known ( $\mu$ )  $\pm$  0.43 \*  $\mu$ , for  $\mu$  > 20 pCi/l

The U.S. EPA sets control limits for gross beta measurements as follows : Control Limits = Known ( $\mu$ )  $\pm$  0.26 \*  $\mu$ , for  $\mu$  > 100 pCi/l

ATI conservatively uses these control limits for all gross alpha/beta measurements

Acceptance Range for blank spike samples is the known value  $\pm$  the control limits stated above. The reported value, without the uncertainty, should be compared to that range.

#### Remarks:

Sample 93-07-033-S2 is a blank spike duplicate.



# RADIUM 226 RESULTS Method 901.1

Lab Name: Analytical Technologies, Inc.

Date Collected: 06-30-93

Client Name: ATI-NM

Date Analyzed: 07-29-93

Client Project ID : SAIC -- 307308

Sample Matrix: Air

Lab Workorder Number: 93-07-033

Client Sample ID	Lab Sample ID	Radium 226 (pCi/l)
307308-1	07-033-01	< 0.02(BDL)
307308-2	07-033-02	< 0.03(BDL)
307308-3	07-033-03	< 0.03(BDL)
Blank	07-033-B1	< 0.05(BDL)

#### Remarks:

Sample results reported as pCi/l of air.

BDL = Below Detection Limit; see method for DL determination



## TOTAL URANIUM ANALYSIS RESULTS SUMMARY Method 908.0

Lab Name: Analytical Technologies, Inc. Date Collected: 06/30/93

Client Name: ATI-NM

Date Analyzed: 07/29/93

Client Project ID: SAIC -- 307308

Sample Matrix : Water

Lab Sample ID Series: 93-07-033

Count Duration: 500 Min.

Client Sample ID	Lab Sample ID	Total Uranium (pCi/l)
307308-1	07-033-01	< 0.00(BDL)
307308-2	07-033-02	< 0.01(BDL)
307308-3	07-033-03	< 0.01(BDL)
Blank	07-033-B1	< 0.17(BDL)
Blank	07-033-B2	< 0.14(BDL)

BDL = Below Detection Limit; see method for DL determination Remarks:

Units are in pCi/liter of air.



## TOTAL URANIUM QA ANALYSIS RESULTS SUMMARY

Method 908.0

Lab Name: Analytical Technologies, Inc.

Date Collected: 06/30/93

Client Name: ATI-NM

Date Analyzed: 07/29/93

Client Project ID: SAIC -- 307308

Sample Matrix : Water

Lab Sample ID Series: 93-07-033

Lab Sample ID	Known Activity (pCi/l)	Rep't Activity (pCi/l)
93-07-033-S1	12.4 ± 5.2	12.41 ± 0.14
93-07-033-S2	12.4 ± 5.2	12.80 ± 0.13
93-07-033-S3	12.4 ± 5.2	11.99 ± 0.26

Reported Uncertainties are at the 95 % Confidence Interval

The U.S. EPA sets control limits for Uranium measurements as follows : Control Limits = Known ( $\mu$ )  $\pm$  5.2 pCi/l, for  $\mu$  <= 35 pCi/l

Control Limits = Known ( $\mu$ )  $\pm$  0.17 \*  $\mu$ , for  $\mu$  > 35 pCi/l

ATI uses these control limits for all Total Uranium measurements

Acceptance Range for blank spike samples is the known value ± the control limits stated above. The reported value, without the uncertainty, should be compared to that range.

Chain-of-Custody Record 10-30-30-8

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## ANALYTICAL RESULTS

**FOR** 

# SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

ENSECO-RMAL NO. 030081

JULY 28, 1993

Reviewed by:

Nancy Voiland-Dow

SAIC Project: San Mateo Initial Site Investigation

Enseco Incorporated 4955 Yarrow Street Arvada, Colorado 80002 303/421-6611 Fax: 303/431-7171

#### I. OVERVIEW

On July 7, 1993, Enseco-Rocky Mountain Analytical Laboratory received twelve soil samples and four aqueous samples from Science Applications International Corporation (SAIC). As directed by Mike Brazie of SAIC on July 9, 1993, all of the radium-228 and hardness analyses requested on the Chain of Custody were cancelled. All analyses requested on the Chain of Custody (except those cancelled) will be reported on this project with the exception of radium-226. the radium-226 will be reported under Rocky Mountain Analytical Laboratory project number 030088. Trip blanks were provided with the samples, but were not necessary for radiochemical analyses. Therefore, they were not analyzed.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- I. Overview
- II. Sample Description Information/Analytical Test Requests
- III. Analytical Results
- IV. Quality Control Report

#### **DISCUSSION**

#### Metals Data Review

Enseco protocol states that samples analyzed by graphite furnace atomic absorption (GFAA), will have a spiked aliquot analyzed with each sample. If the spike recovery does not meet established criteria, the reporting limit for that analysis is raised proportionately. Poor spike recoveries of this type are typically due to interferences from the sample matrix.

In reviewing the GFAA metals data it is necessary to know what the nominal reporting limits are in order to determine whether or not those limits were raised due to matrix interference. The most common GFAA elements and their



nominal reporting limits are listed in the table below. These are provided to facilitate the review of the GFAA metals data.

#### Common GFAA Elements

#### Reporting Limit / Units

<u>Element</u>	Aqueous (mq/L)	Soil (mg/kg)	Waste (mg/kg)	<u>Leachate (mg/L)</u>
Arsenic	0.005	0.5 **	0.5 **	0.05 **
Lead	0.005	0.5	0.5 **	0.05 **
Selenium	0.005	0.5	0.5	0.05
Thallium	0.005	0.5	0.5	0.05

\*\*For the matrix listed, the preferred method for this element is by Method 6010

Mercury by cold vapor atomic absorption (CVAA), Method 245.1/7470/7471, and analytes performed by Method 200.7/6010 are not subject to the same type of interferences as GFAA metals and therefore do not require a spiked aliquot for each sample. The nominal reporting limits for analytes by these methods are given in the method blank report. Typically a raised reporting limit by these methods is also due to matrix interferences. However, for all methods mentioned here, a raised reporting limit may also be the result of target analyte concentrations or blank contamination.

A reagent blank is analyzed with all radiochemistry parameters and must be within established control limits. The results for gross alpha and gross beta are calculated by subtracting the historical mean of the instrument background.



The efficiencies used to calculate gross alpha and gross beta activities for all samples in this project except for Rocky Mountain Analytical Laboratory (RMAL) 030081-0012-SA were based on an absorption curve comprised of a series of standards of varying density containing thorium-230 for alpha and strontium-90/yttrium-90 for beta. For RMAL sample 030081-0012-SA calculations were based on a single point efficiency from the standard with the closest mass. Residue densities for these samples did not exceed 5mg/cm2.

The minimum detectable activities were elevated above the nominal limits of 6 pCi/L for gross alpha and 10 pCi/L for gross beta for RMAL samples 030081-0008-SA, -0014-SA and -0016-SA due to the high level of dissolved and/or suspended solids present in these samples.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required. RMAL sample 030081-0013-SA was diluted for uranium analysis due to the level of that analyte present in the sample. The reporting limit has been adjusted accordingly.II.SAMPLE DESCRIPTION

#### II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

#### Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

#### Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.



# SAMPLE DESCRIPTION INFORMATION for Science Applications International Corporation

			Sampled	Received
Lab ID	Client ID	Matrix	Date Time	Date
030081-0001-SA 030081-0002-SA 030081-0003-SA 030081-0005-SA 030081-0006-SA 030081-0007-SA 030081-0008-FB 030081-0009-SA 030081-0010-SA 030081-0011-SA 030081-0012-SA 030081-0013-SA	SS-1 SAN MATEO MINE SS-2 SAN MATEO MINE SS-3 SAN MATEO MINE SS-4 SAN MATEO MINE SS-5 SAN MATEO MINE DUP-1 SAN MATEO MINE DUP-2 SAN MATEO MINE FB-1 SAN MATEO MINE SD-3 ARROYO SD-1 SAN MATEO CREEK SD-2 SAN MATEO CREEK SD-2 SAN MATEO CREEK SD-4 LEACH PAD SD-5 LEACH PAD GW-2 MARCUS WELL	SOIL SOIL SOIL SOIL SOIL AQUEOUS SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOI	01 JUL 93 17:50 02 JUL 93 09:00 02 JUL 93 09:15 02 JUL 93 09:45 01 JUL 93 13:15 01 JUL 93 16:10 02 JUL 93 11:20 02 JUL 93 11:20 01 JUL 93 10:30	07 JUL 93 07 JUL 93
030081-0015-SA 030081-0016-SA	GW-3 RED ROCK WELL GW-1 LEE WELL	AQUEOUS AQUEOUS	01 JUL 93 11:40 02 JUL 93 14:00	07 JUL 93

# ANALYTICAL TEST REQUESTS for Science Applications International Corporation

Lab ID: 030081	Group Code	Analysis Description	Custom Test?
0001 - 0005, 0009 - 0013	A	Gross Alpha/Beta-Gas Proportional Counter Prep- Gross Alpha/Beta-Gas Proportional Counter Total Uranium in soil/ Fluorometry Prep - Total Uranium in soil/waste Fluorometry Radiological Screen ICP Metals (Total) Prep - Total Metals, ICP Selenium, Furnace AA Prep - Total Metals, Furnace AA Arsenic, Furnace AA Lead, Furnace AA	N N N N N N N N N N N N N N N N N N N
0006	В	Radiological Screen ICP Metals (Total) Prep - Total Metals, ICP Selenium, Furnace AA Prep - Total Metals, Furnace AA Arsenic, Furnace AA Lead, Furnace AA	N N N N N
0007	С	Radiological Screen ICP Metals (Total) Prep - Total Metals, ICP Selenium, Furnace AA Prep - Total Metals, Furnace AA Arsenic, Furnace AA Lead, Furnace AA Total Uranium in soil/ Fluorometry Prep - Total Uranium in soil/waste Fluorometry	N Y N N N N N
0008 , 0014, 0015 - 0016	D	Gross Alpha/Beta- Gas Proportional Counter Prep- Gross Alpha/Beta Gas Proportional Counter Total Uranium in water/ Fluorometry Prep - Total Uranium in water/ Fluorometry Radiological Screen ICP Metals (Total) Prep - Total Metals, ICP Selenium, Furnace AA (Total) Prep - Total Metals, Furnace AA Arsenic, Furnace AA (Total) Lead, Furnace AA (Total)	N N N N N N N N N N N N N N N N N N N

#### III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL does not routinely blank-correct analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.5, May, 1992.

The analytical data reported are subject to the following limitations of the analytical methodology:

#### <u>Metals</u>

Arsenic, selenium and thallium are customarily determined by graphite furnace atomic absorption (GFAA). All mercury determinations are by cold vapor atomic absorption. All other metals are determined using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP).

All metals nominal reporting limits are statistically determined by analyzing a reagent blank seven times on three non-consecutive days. The standard deviations from each group of analyses are then summed (reporting limit = three times the standard deviation of a blank). The ability to attain the quoted reporting limits is verified each quarter. Reporting limits above nominal values are often reported since sample matrix interferences must be compensated for by dilutions prior to analysis or by the use of Method of Standard Additions. All GFAA reporting limits and results are verified by spike recoveries and represent the lowest attainable for each sample matrix. The metals reporting limits reported should not be viewed as quantitation limits. As recommended by the American Chemical Society Subcommittee on Environmental relytical Chemistry (Analytical Chemistry 1980, 52, 2242-49), the Limit of Quantitation (LOQ) is equal to ten times the standard deviation of a blank or 3.3 times the reporting limit.



#### Total Metals

Client Name: Science Applications International Corporation Client ID: SS-1 SAN MATEO MINE Lab ID: 030081-0001-SA Matrix: SOIL Sampled: 01 JUL 93 Ref Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	3.2 71.6 5.3 ND ND 14.1	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 0.50 2.0 1.0	7060 6010 7421 6010 7740 6010		21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy



#### Total Metals

Client Name: Science Applications International Corporation Client ID: SS-2 SAN MATEO MINE Lab ID: 030081-0002-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Authorized: 07 JUL 93 Sampled: 02 JUL 93 Prepared: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	6.6 90.9 13.4 95.3 8.8 70.5	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 2.5 2.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93 21 JUL 93 22 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy



#### Total Metals

Client Name: Science Applications International Corporation
Client ID: SS-3 SAN MATEO MINE
Lab ID: 030081-0003-SA
Matrix: SOIL Sampled: 02 JUL 93 Re Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Authorized: 07 JUL 93 Sampled: 02 JUL 93 Prepared: See Below

Parameter	Result	Wet wt. Units	. Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	3.6 86.0 4.5 12.9 12.0 44.5	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 0.50 2.0 5.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

#### Total Metals

Client Name: Science Applications International Corporation Client ID: SS-4 SAN MATEO MINE Lab ID: 030081-0004-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 02 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	19.9 46.8 10.8 885 142 71.2	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	2.5 1.0 1.0 2.0 50.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93 21 JUL 93 22 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

#### Total Metals

Client Name: Science Applications International Corporation Client ID: SS-5 SAN MATEO MINE Lab ID: 030081-0005-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 02 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	5.2 502 9.4 97.5 11.2 72.4	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 1.0 2.0 5.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93 21 JUL 93 22 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

### Total Metals

Client Name: Science Applications International Corporation Client ID: DUP-1 SAN MATEO MINE Lab ID: 030081-0006-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	2.1 55.1 37.8 5.4 2.5 20.7	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 5.0 2.0 0.50 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy





#### Total Metals

Client Name: Science Applications International Corporation Client ID: DUP-2 SAN MATEO MINE Lab ID: 030081-0007-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Authorized: 07 JUL 93 Sampled: 01 JUL 93 Prepared: See Below

Parameter	Result	Wet wt. Units	. Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	2.2 65.0 4.7 ND ND 12.2	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 0.50 2.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93 21 JUL 93 22 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

## A Coming Company

#### Metals

#### Total Metals

Client Name: Science Applications International Corporation Client ID: FB-1 SAN MATEO MINE Lab ID: 030081-0008-FB Matrix: AQUEOUS Sampled: 02 JUL 93 ReAuthorized: 07 JUL 93 Prepared: See Below And Action See Below And Action See Below Read See Below And Action See Below Received: 07 JUL 93 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	ND ND ND ND ND	mg/L mg/L mg/L mg/L mg/L mg/L	0.0050 0.010 0.0050 0.020 0.0050 0.010	7060 6010 7421 6010 7740 6010	19 JUL 93 19 JUL 93 19 JUL 93 19 JUL 93	20 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

#### Total Metals

Client Name: Science Applications International Corporation
Client ID: SD-3 ARROYO
Lab ID: 030081-0009-SA
Matrix: SOIL Sampled: 01 JUL 93 Re

Matrix: SOIL Authorized: 07 JUL 93

Sampled: 01 JUL 93 Prepared: See Below

Received: 07 JUL 93 Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	3.1 58.8 5.3 3.3 2.7 30.0	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 0.50 2.0 0.50 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

#### Total Metals

Client Name: Science Applications International Corporation Client ID: SD-1 SAN MATEO CREEK Lab ID: 030081-0010-SA Matrix: SOIL Sampled: 01 JUL 93 Re Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	5.0 99.9 9.7 ND ND 16.4	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 1.0 2.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy



#### Total Metals

Client Name: Science Applications International Corporation Client ID: SD-2 SAN MATEO CREEK Lab ID: 030081-0011-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	2.3 29.8 4.2 ND ND 7.2	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 0.50 2.0 0.50 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

#### Total Metals

Client Name: Science Applications International Corporation Client ID: SD-4 LEACH PAD Lab ID: 030081-0012-SA Matrix: SOIL Sampled: 02 JUL 93 ReAuthorized: 07 JUL 93 Prepared: See Below And And Authorized: O7 JUL 93 Prepared: See Below Authorized: O7 JUL 93 Prepared: See Below And Authorized: O7 JUL 93 Prepared: See Below Authorized: O7 JUL 93 Prepared: O7 JUL 94 Prepared: O7 JUL 94 Prepa

Received: 07 JUL 93 Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	3.5 130 11.5 7.3 28.9 94.9	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 1.0 2.0 5.0 1.0	7060 6010 7421 6010 7740 6010		21 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

# Metals

# Total Metals

Client Name: Science Applications International Corporation Client ID: SD-5 LEACH PAD Lab ID: 030081-0013-SA

Matrix:

Authorized: 07 JUL 93

SOIL

Sampled: 02 JUL 93 Prepared: See Below

Received: 07 JUL 93 Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	4.1 230 24.2 30.8 22.0 288	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.50 1.0 5.0 2.0 5.0 1.0	7060 6010 7421 6010 7740 6010	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93	21 JUL 93 21 JUL 93 21 JUL 93 21 JUL 93 22 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

# Metals

# Total Metals

Client Name: Science Applications International Corporation Client ID: GW-2 MARCUS WELL Lab ID: 030081-0014-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: AQUEOUS Authorized: 07 JUL 93 Sampled: 01 JUL 93 Prepared: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	ND 0.025 ND ND ND ND	mg/L mg/L mg/L mg/L mg/L mg/L	0.0050 0.010 0.010 0.020 0.010 0.010	7060 6010 7421 6010 7740 6010	19 JUL 93 19 JUL 93 19 JUL 93 19 JUL 93	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

# Metals



# Total Metals

Client Name: Science Applications International Corporation Client ID: GW-3 RED ROCK WELL Lab ID: 030081-0015-SA

Lab ID: Matrix: Received: 07 JUL 93 Analyzed: See Below Matrix: AQUEOUS Authorized: 07 JUL 93 Sampled: 01 JUL 93 Prepared: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	ND ND ND ND 0.39 ND	mg/L mg/L mg/L mg/L mg/L mg/L	0.0050 0.010 0.010 0.020 0.050 0.010	7060 6010 7421 6010 7740 6010	19 JUL 93 19 JUL 93 19 JUL 93 19 JUL 93	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93 22 JUL 93 20 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy

# Enseco

# Metals

# Total Metals

Client Name: Science Applications International Corporation
Client ID: GW-1 LEE WELL
Lab ID: 030081-0016-SA
Matrix: AQUEOUS Sampled: 02 JUL 93 Re
Authorized: 07 JUL 93 Prepared: See Below An

Received: 07 JUL 93 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic Barium Lead Molybdenum Selenium Vanadium	ND 0.15 ND ND ND 0.015	mg/L mg/L mg/L mg/L mg/L mg/L	0.0050 0.010 0.0050 0.020 0.0050 0.010	7060 6010 7421 6010 7740 6010	19 JUL 93 19 JUL 93 19 JUL 93 19 JUL 93	20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93 20 JUL 93

ND = Not detected NA = Not applicable

Reported By: Steven Gouy



Client Name: Science Applications International Corporation Client ID: SS-1 SAN MATEO MINE Lab ID: 030081-0001-SA Matrix: SOIL

Matrix: SOIL Authorized: 07 JUL 93 Received: 07 JUL 93 Sampled: 01 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-1.4E+1	pCi/g	DIRECT COUNT	22 JUL 93
Gross Beta		+/-1.4E+1	pCi/g	DIRECT COUNT	22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-1 SAN MATEO MINE Lab ID: 030081-0001-SA

Sampled: 01 JUL 93 Prepared: See Below Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Authorized: 07 JUL 93

Prepared Analyzed Reporting Analytical Date Date Parameter Result Units Limit Method

20 JUL 93 21 JUL 93 EPA 908.1M Uranium 1.7E+0 1.0E+0 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-2 SAN MATEO MINE

030081-0002-SA Lab ID: Matrix:

Matrix: SOIL Authorized: 07 JUL 93 Received: 07 JUL 93 Sampled: 02 JUL 93

+/- 2 Sigma Result Uncertainty Analytical Analyzed Method Date Parameter Units DIRECT COUNT DIRECT COUNT 22 JUL 93 22 JUL 93 Gross Alpha Gross Beta 1.027E+3 +/-5.6E+1 4.55E+2 +/-2.5E+1 pCi/g pCi/g

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-2 SAN MATEO MINE Lab ID: 030081-0002-SA

Sampled: 02 JUL 93 Prepared: See Below Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Authorized: 07 JUL 93

Reporting Analytical Prepared Analyzed Units Limit Method Date Date Parameter Result

20 JUL 93 21 JUL 93 1.0E+0 EPA 908.1M Uranium 1.8E+2 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper

Client Name: Science Applications International Corporation Client ID: SS-3 SAN MATEO MINE Lab ID: 030081-0003-SA Matrix: SOIL

Sampled: 02 JUL 93 Received: 07 JUL 93 Authorized: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-3.5E+l	pCi/g	DIRECT COUNT	22 JUL 93
Gross Beta		+/-1.6E+l	pCi/g	DIRECT COUNT	22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-3 SAN MATEO MINE Lab ID: 030081-0003-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 02 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Prepared Analyzed Reporting Analytical Parameter Result Units Limit Method Date Date

1.0E+0 EPA 908.1M Uranium 8.1E+1 20 JUL 93 21 JUL 93 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-4 SAN MATEO MINE Lab ID: 030081-0004-SA

Matrix: SOIL

Received: 07 JUL 93 Authorized: 07 JUL 93 Sampled: 02 JUL 93

+/- 2 Sigma Result Uncertainty Analytical Analyzed Parameter Units Method Date DIRECT COUNT DIRECT COUNT 22 JUL 93 22 JUL 93 Gross Alpha Gross Beta 1.724E+3 +/-7.5E+1 5.42E+2 +/-3.1E+1 pCi/g pCi/g

Reported By: Tina Pieper

Client Name: Science Applications International Corporation Client ID: SS-4 SAN MATEO MINE

Lab ID: 030081-0004-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: SOIL Sampled: 02 JUL 93 Authorized: 07 JUL 93 Prepared: See Below

Analytical Method Prepared Analyzed Reporting Units Date Date Parameter Result Limit

EPA 908.1M 20 JUL 93 22 JUL 93 Uranium 3.6E+2 1.0E+0 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation
Client ID: SS-5 SAN MATEO MINE
Lab ID: 030081-0005-SA
Matrix: SOIL

Matrix: SOIL Authorized: 07 JUL 93 Sampled: 02 JUL 93 Received: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-6.8E+1	pCi/g	DIRECT COUNT	22 JUL 93
Gross Beta		+/-3.1E+1	pCi/g	DIRECT COUNT	22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SS-5 SAN MATEO MINE Lab ID: 030081-0005-SA

SOIL 07 JUL 93 Received: 07 JUL 93 Analyzed: See Below Sampled: 02 JUL 93 Matrix: Authorized: Prepared: See Below

Prepared Analyzed Reporting Analytical Parameter Result Units Limit Method Date Date

1.0E+0 EPA 908.1M 20 JUL 93 22 JUL 93 Uranium 3.9E+2 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper

Client Name: Science Applications International Corporation Client ID: DUP-2 SAN MATEO MINE

030081-0007-SA Lab ID:

Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Prepared Analyzed Reporting Analytical Method Units Date Parameter Result Limit Date

1.0E+0 EPA 908.1M 20 JUL 93 21 JUL 93 Uranium 2.5E+0 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: FB-1 SAN MATEO MINE Lab ID: 030081-0008-FB

Lab ID: Matrix:

AQUEOUS 07 JUL 93 Authorized: Sampled: 02 JUL 93 Received: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-1.2E+0	pCi/L	EPA 9310	15 JUL 93
Gross Beta		+/-3.3E+0	pCi/L	EPA 9310	15 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: FB-1 SAN MATEO MINE Lab ID: 030081-0008-FB

Received: 07 JUL 93 Analyzed: See Below Sampled: 02 JUL 93 Prepared: See Below Matrix: AQUEOUS 07 JUL 93 Authorized:

Reporting Analytical Prepared Analyzed Method Date Date Parameter Result Units Limit EPA 908.1 19 JUL 93 21 JUL 93 Uranium ND ug/L 1.0E+0

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-3 ARROYO

Client ID: SD-3 ARROYO Lab ID: 030081-0009-SA

Matrix: SOIL

Authorized: 07 JUL 93 Sampled: 01 JUL 93 Received: 07 JUL 93

Parameter Result Uncertainty Units Analytical Analyzed Date Gross Alpha 5.11E+3 +/-1.3E+2 pCi/g DIRECT COUNT 22 JUL 93 Gross Beta 3.390E+3 +/-9.3E+1 pCi/g DIRECT COUNT 22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-3 ARROYO Lab ID: 030081-0009-SA

Matrix:

SOIL

Received: 07 JUL 93 Analyzed: See Below

Authorized:

07 JUL 93

Sampled: 01 JUL 93 Prepared: See Below

Prepared Analyzed

Parameter

Result

Units

Reporting Analytical Limit

Method

Date

Date

Uranium

2.9E+1

ug/g

1.0E+0 EPA 908.1M

20 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-1 SAN MATEO CREEK Lab ID: 030081-0010-SA

Matrix: SOIL Authorized: 07 JUL 93 Received: 07 JUL 93 Sampled: 01 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha	3.11E+2	+/-3.4E+1	pCi/g	DIRECT COUNT	22 JUL 93
Gross Beta	1.23E+2	+/-2.0E+1	pCi/g	DIRECT COUNT	22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-1 SAN MATEO CREEK Lab ID: 030081-0010-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Prepared Analyzed Reporting Analytical Limit Method Parameter Units Date Date Result

2.2E+0 ug/g 20 JUL 93 21 JUL 93 Uranium 1.0E+0 EPA 908.1M

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-2 SAN MATEO CREEK

Lab ID: 030081-0011-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: SOIL Authorized: 07 JUL 93

Reporting Analytical Limit Method Prepared Analyzed Date Parameter Units Result Date

1.0E+0 EPA 908.1M 20 JUL 93 21 JUL 93 Uranium 1.6E+0 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-2 SAN MATEO CREEK

Lab ID: 030081-0011-SA Matrix:

SOIL 07 JUL 93 Authorized:

Received: 07 JUL 93 Sampled: 01 JUL 93

Analytical Method +/- 2 Sigma Uncertainty Analyzed Parameter Units Date Result DIRECT COUNT DIRECT COUNT 22 JUL 93 22 JUL 93 Gross Alpha Gross Beta pCi/g pCi/g 9.8E+0 +/-1.2E+12.0E+0 +/-1.3E+1

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-4 LEACH PAD Lab ID: 030081-0012-SA Matrix: SOIL

Received: 07 JUL 93 Authorized: 07 JUL 93 Sampled: 02 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-1.3E+2	pCi/g	DIRECT COUNT	28 JUL 93
Gross Beta		+/-4.9E+1	pCi/g	DIRECT COUNT	28 JUL 93

Reported By: Lori Pacheco

Approved By: Robert Shannon



Client Name: Science Applications International Corporation Client ID: SD-4 LEACH PAD

1.5E+2 ug/g

Lab ID:

030081-0012-SA

Matrix:

SOIL

Received: 07 JUL 93 Analyzed: See Below

Authorized: 07 JUL 93

Sampled: 02 JUL 93 Prepared: See Below

Reporting Analytical Limit Method

Prepared Analyzed

Date Date

Parameter Uranium

Result

Units

1.0E+0 EPA 908.1M

20 JUL 93 22 JUL 93

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-5 LEACH PAD Lab ID: 030081-0013-SA Matrix: SOIL

Matrix: SOIL Authorized: 07 JUL 93 Received: 07 JUL 93 Sampled: 02 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-5.7E+1	pCi/g	DIRECT COUNT	22 JUL 93
Gross Beta		+/-2.4E+1	pCi/g	DIRECT COUNT	22 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: SD-5 LEACH PAD

Lab ID: 030081-0013-SA

Received: 07 JUL 93 Analyzed: See Below Matrix: Sampled: 02 JUL 93 SOIL Authorized: 07 JUL 93 Prepared: See Below

Reporting Analytical Prepared Analyzed Units Limit Method Date Date Result Parameter

20 JUL 93 22 JUL 93 2.9E+0 EPA 908.1M Uranium 2.3E+3 ug/g

ND = Not detected NA = Not applicable

Reported By: Tina Pieper

Client Name: Science Applications International Corporation Client ID: GW-2 MARCUS WELL Lab ID: 030081-0014-SA Matrix: AQUEOUS Authorized: 07 JUL 93 Sampled: 01 JUL 93

Received: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-1.5E+l	pCi/L	EPA 9310	15 JUL 93
Gross Beta		+/-2.9E+l	pCi/L	EPA 9310	15 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: GW-2 MARCUS WELL Lab ID: 030081-0014-SA

Received: 07 JUL 93 Analyzed: See Below

Matrix: AQUEOUS Authorized: 07 JUL 93

Sampled: 01 JUL 93 Prepared: See Below

Parameter

Result

Units

Reporting Analytical Limit Method

Prepared Analyzed Date Date

Uranium

3.5E+0 ug/L

1.0E+0 EPA 908.1

19 JUL 93 21 JUL 93

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: GW-3 RED ROCK WELL Lab ID: 030081-0015-SA Matrix: AQUEOUS Authorized: 07 JUL 93 Sampled: 01 JUL 93

Received: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-2.4E+1	pCi/L	EPA 9310	15 JUL 93
Gross Beta		+/-2.7E+1	pCi/L	EPA 9310	15 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: GW-3 RED ROCK WELL

Lab ID: 030081-0015-SA

Received: 07 JUL 93 Analyzed: See Below Sampled: 01 JUL 93 Prepared: See Below Matrix: AQUEOUS Authorized: 07 JUL 93

Reporting Analytical Limit Method Prepared Analyzed Date Date Units Parameter Result

1.0E+0 EPA 908.1 19 JUL 93 21 JUL 93 Uranium 7.6E+1 ug/L

ND = Not detected NA = Not applicable

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: GW-1 LEE WELL 
Lab ID: 030081-0016-SA 
Matrix: AQUEOUS 
Authorized: 07 JUL 93 Sampled: 02 JUL 93

Received: 07 JUL 93

Parameter	Result	+/- 2 Sigma Uncertainty	Units	Analytical Method	Analyzed Date
Gross Alpha		+/-5.7E+0	pCi/L	EPA 9310	15 JUL 93
Gross Beta		+/-7.1E+0	pCi/L	EPA 9310	15 JUL 93

Reported By: Tina Pieper



Client Name: Science Applications International Corporation Client ID: GW-1 LEE WELL Lab ID: 030081-0016-SA Matrix: AQUEOUS Sampled: 02 JUL 93 ReAuthorized: 07 JUL 93 Prepared: See Below Ar Received: 07 JUL 93 Analyzed: See Below

Prepared Analyzed Reporting Analytical Parameter Units Method Date Date Result Limit

1.0E+0 EPA 908.1 19 JUL 93 21 JUL 93 Uranium 6.4E+0 ug/L

ND = Not detected NA = Not applicable

Reported By: Tina Pieper Approved By: Terry McKibbin

#### IV. QUALITY CONTROL REPORT

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

Accuracy for DCS and SCS is measured by Percent Recovery.

Precision for DCS is measured by Relative Percent Difference (RPD).

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

# QC LOT ASSIGNMENT REPORT Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
	QC Matrix SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL	QC Category ICP-S SE-FAA-S AS-FAA-S PB-FAA-S ICP-S SE-FAA-S PB-FAA-S ICP-S AS-FAA-S PB-FAA-S ICP-S AS-FAA-S ICP-S AS-FAA-S ICP-S AS-FAA-S ICP-S SE-FAA-S ICP-S AS-FAA-S ICP		
030081-0011-SA 030081-0011-SA 030081-0011-SA 030081-0011-SA 030081-0012-SA 030081-0012-SA	SOIL SOIL SOIL SOIL SOIL SOIL SOIL	ICP-S SE-FAA-S AS-FAA-S PB-FAA-S ICP-S SE-FAA-S AS-FAA-S	20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A	20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A 20 JUL 93-9A



# DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation

Analuto	Co Spiked	ncentratio	n Measured			uracy age(%)	Precis (RPD)	
Analyte .	Spiked	DCS1	DCS2	AVG	DCS	Limits	DCS Li	
Category: ICP-S Matrix: SOIL QC Lot: 20 JUL 93-9A Concentration Units:	mg/kg				·			
Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Molybdenum Nickel Potassium Silver Sodium Vanadium Zinc	10700 55.2 145 503 129 154 7390 151 122 162 15400 148 3740 423 159 166 4050 104 747 154 530	9780 38.8 150 484 139 161 7950 157 129 175 15400 151 3990 445 162 175 3940 111 663 158 534	9550 39.8 148 477 136 159 7810 155 127 171 15100 149 3920 436 159 172 3880 110 726 154 529	9660 39.3 149 480 137 160 7880 156 128 173 15200 150 3960 440 160 173 3910 694 156 531	90 71 103 96 106 104 107 103 105 107 99 101 106 104 101 104 97 106 93 101	47-153 18-362 59-141 76-124 53-131 68-132 79-121 66-133 70-130 70-134 66-135 74-126 74-125 71-129 67-133 68-132 76-124 57-130 73-127 65-135	2.4 2.5 1.5 1.7 1.5 1.7 1.5 2.2 1.9 1.9 1.9 2.3 1.0	14 #J {4 (4 14 14 14 14 14 14 14 14 14 14 14 14 14
	mg/kg							
Selenium	143	159	163	161	113	68-132	2.5	
Category: AS-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Concentration Units:	mg/kg 145	142	152	147	101	59-141	6.8	

Calculations are performed before rounding to avoid round-off errors in calculated results



# QC LOT ASSIGNMENT REPORT Metals Analysis and Preparation (cont.)

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
030081-0012-SA	SOIL	PB-FAA-S	20 JUL 93-9A	20 JUL 93-9A
030081-0013-SA	SOIL	ICP-S	20 JUL 93-9A	20 JUL 93-9A
030081-0013-SA	SOIL	SE-FAA-S	20 JUL 93-9A	20 JUL 93-9A
030081-0013-SA	SOIL	AS-FAA-S	20 JUL 93-9A	20 JUL 93-9A
030081-0013-SA	SOIL	PB-FAA-S	20 JUL 93-9A	20 JUL 93-9A
030081-0014-SA	AQUEOUS	ICP-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0014-SA	AQUEOUS	SE-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0014-SA	AQUEOUS	AS-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0014-SA	AQUEOUS	PB-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0015-SA	AQUEOUS	ICP-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0015-SA	AQUEOUS	SE-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0015-SA	AQUEOUS	AS-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0015-SA	AQUEOUS	PB-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0016-SA	AQUEOUS	ICP-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0016-SA	AQUEOUS	SE-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0016-SA	AQUEOUS	AS-FAA-AT	19 JUL 93-9A	19 JUL 93-9A
030081-0016-SA	AQUEOUS	PB-FAA-AT	19 JUL 93-9A	19 JUL 93-9A



DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation (cont.)

 $\Gamma_1$ 

Analyte	Cor Spiked	ncentratio	n Measured			uracy age(%)	Precisio (RPD)	
Analyte	op mee	DCS1	DCS2	AVG	DCS	Limits	DCS Limi	
Category: PB-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Concentration Units: mg/kg						·		
Lead	148	141	148	144	98	50-150	4.8 2	
Category: ICP-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9A Concentration Units: mg/L								
Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	2.00 0.500 0.500 2.00 0.0500 0.0500 0.200 0.500 0.500 0.500 0.500 0.500 0.500 0.500	1.93 0.502 0.452 2.03 0.0507 0.0519 102 0.197 0.493 0.254 1.05 0.563 49.2 0.488 0.490 48.2 0.0505 96.6 0.524 0.484	1.94 0.466 0.442 2.06 0.0510 0.0498 102 0.196 0.492 0.257 1.03 0.555 49.8 0.492 0.487 50.1 0.0510 97.7 0.528 0.488	1.94 0.484 0.447 2.05 0.0508 0.0509 102 0.197 0.492 0.255 1.04 0.559 49.5 0.490 0.488 49.2 0.0508 97.1 0.526 0.486	97 97 89 102 102 102 102 104 112 99 98 98 102 104 112 97 105	75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125 75-125	0.3 7.3 2.2 1.6 0.6 4.2 0.3 0.4 0.2 1.0 2.2 1.5 1.3 0.9 0.8 3.8 1.1	
Category: SE-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9A Concentration Units: mg/L								
Selenium	0.0300	0.0327	0.0325	0.0326	109	75-125	0.6	

Calculations are performed before rounding to avoid round-off errors in calculated results



DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation (cont.)

Amalyta		Cor Spiked	ncentratio	n Measured			uracy age(%)	Precis (RPD)	
Analyte		Spiked	DCS1	DCS2	AVG	DCS	Limits	DĊS Li	
Category: AS-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9A Concentration Units: Arsenic	mg/L	0.0300	0.0290	0.0275	0.0282	94	75-125	5.3	i
Category: PB-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9A Concentration Units: Lead	mg/L	0.0300	0.0315	0.0302	0.0308	103	75-125	4.2	;

Calculations are performed before rounding to avoid round-off errors in calculated results

## METHOD BLANK REPORT Metals Analysis and Preparation

Analyte	٠	Resi	ılt	Units	Reporting Limit
Test: ICP-S Matrix: SOIL QC Lot: 20 JUL 93-9A Barium Molybdenum Vanadium	QC Run:	20 JUL 93-9A	ND ND ND	mg/kg mg/kg mg/kg	1.0 2.0 1.0
Test: SE-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Selenium	QC Run:	20 JUL 93-9A	ND	mg/kg	0.50
Test: AS-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Arsenic	QC Run:	20 JUL 93-9A	ND	mg/kg	o.50
Test: PB-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Lead	QC Run:	20 JUL 93-9A	ND	mg/kg	0.50
Test: ICP-S Matrix: SOIL QC Lot: 20 JUL 93-9A Barium Molybdenum Vanadium	QC Run:	20 JUL 93-9A	ND ND ND	mg/kg mg/kg mg/kg	1.0 2.0 1.0



## METHOD BLANK REPORT Metals Analysis and Preparation (cont.)

Analyte		Result	Units	Reporting Limit
Test: SE-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Selenium	QC Run:	20 JUL 93-9A ND	mg/kg	0.50
Test: AS-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Arsenic	QC Run:	20 JUL 93-9A ND	mg/kg	0.50
Test: PB-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Lead	QC Run:	20 JUL 93-9A ND	mg/kg	0.50
Test: ICP-S Matrix: SOIL QC Lot: 20 JUL 93-9A Barium Molybdenum Vanadium	QC Run:	20 JUL 93-9A ND ND ND	mg/kg mg/kg mg/kg	1.0 2.0 1.0
Test: SE-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Selenium	QC Run:	20 JUL 93-9A ND	mg/kg	0.50
Test: AS-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9A Arsenic	QC Run:	20 JUL 93-9A ND	mg/kg	0.50

Enseco A Corning Company

### METHOD BLANK REPORT Metals Analysis and Preparation (cont.)

Analyte		Result	Units	Reporting Limit
Test: PB-FAA-S Matrix: SOIL QC Lot: 20 JUL 93-9	A QC Run:	20 JUL 93-9A		
Lead		ND	mg/kg	0.50
Test: ICP-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9	A QC Run:	19 JUL 93-9A		
Barium Molybdenum Vanadium		ND ND ND	mg/L mg/L mg/L	0.010 0.020 0.010
Test: SE-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9 Selenium	A QC Run:	19 JUL 93-9A ND	mg/L	0.0050
Test: AS-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9 Arsenic	A QC Run:	19 JUL 93-9A ND	mg/L	0.0050
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 19 JUL 93-9 Lead	A QC Run:	19 JUL 93-9A ND	mg/L	0.0050

# QC LOT ASSIGNMENT REPORT Radiochemistry

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
030081-0001-SA 030081-0001-SA 030081-0002-SA 030081-0002-SA 030081-0003-SA	SOLID SOLID SOLID SOLID SOLID	GAB-S UTOT-S GAB-S UTOT-S GAB-S	16 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A	21 JUL 93-9B 21 JUL 93-9B
030081-0003-SA 030081-0004-SA 030081-0004-SA 030081-0005-SA	SOLID SOLID SOLID SOLID SOLID	UTOT-S GAB-S UTOT-S GAB-S UTOT-S	15 JUL 93-9A 16 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A 15 JUL 93-9A	21 JUL 93-9B 22 JUL 93-9A 22 JUL 93-9A
030081-0005-SA 030081-0007-SA 030081-0008-FB 030081-0008-FB 030081-0009-SA	SOLID SOLID AQUEOUS AQUEOUS SOLID	UTOT-S GAB-A UTOT-A GAB-S	15 JUL 93-9A 15 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A	21 JUL 93-98 21 JUL 93-9A
030081-0009-SA 030081-0010-SA 030081-0010-SA 030081-0011-SA	SOLID SOLID SOLID SOLID	UTOT-S GAB-S UTOT-S GAB-S	15 JUL 93-9A 16 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A	21 JUL 93-9B 21 JUL 93-9B 21 JUL 93-9B
030081-0011-SA 030081-0012-SA 030081-0012-SA 030081-0013-SA 030081-0013-SA	SOLID SOLID SOLID SOLID SOLID	UTOT-S GAB-S UTOT-S GAB-S UTOT-S	15 JUL 93-9A 28 JUL 93-9A 15 JUL 93-9A 16 JUL 93-9A 15 JUL 93-9A	22 JUL 93-9A 22 JUL 93-9B
030081-0014-SA 030081-0014-SA 030081-0015-SA 030081-0015-SA 030081-0016-SA	AQUEOUS AQUEOUS AQUEOUS AQUEOUS AQUEOUS AQUEOUS	GAB-A UTOT-A GAB-A UTOT-A GAB-A	15 JUL 93-9A 15 JUL 93-9A 15 JUL 93-9A 15 JUL 93-9A 15 JUL 93-9A	21 JUL 93-9A 21 JUL 93-9A
030081-0016-SA	AQUEOUS	UTOT-A	15 JUL 93-9A	21 JUL 93-9A



# **Enseco Mixed Waste Laboratory Radiochemistry Quality Control Report**

Parameter:

Gross Alpha and Beta

QC Lot:

15-Jul-93 -9A

QC Category: GAB-A Matrix:

Aqueous

#### **Duplicate Control Sample Report**

	Observed	Spike		
Sample	Activity +/- 2g	Activity +/- 2g	Units	Accuracy
DCS1 Alpha	9.96E+01 +/- 4.40E+00	8.79E+01 +/- 5.59E+00	pCi/ml	113%
DCS2 Alpha	9.39E+01 +/- 4.26E+00	8.79E+01 +/- 5.59E+00	pCi/ml	107%
DCS1 Beta	1.88E+02 +/- 7.80E+00	1.75E+02 +/- 2.16E+00	pCi/ml	108%
DCS2 Beta	1.90E+02 +/- 7.84E+00	1.75E+02 +/- 2.16E+00	pCi/ml	109%

#### **Duplicate Control Sample Statistics**

	Mean		Precision	
Analyte	Accuracy	Limits	(RPD)	Limits
Gross Alpha	110%	70-130%	7%	20%
Gross Beta	108%	70-130%	1%	20%

# **Enseco Mixed Waste Laboratory Radiochemistry Quality Control Report**



Parameter:

Gross Alpha and Beta

QC Lot:

16-Jul-93 -9A

QC Category: GAB-S

Matrix:

SOIL

### Control Sample Report

Obser	/ed		Spike				
Sample Activ	ity +/-	- 2σ	Activity	+/-	2σ	Units	Accuracy
Alpha Standard 3.98E+	02 +/	- 2.50E+01	3.17E+02	+/-	1.01E+01	pCi/g	126%
Beta Standard 9.42E+	01 +/	- 2.02E+00	9.19E+01	+/-	3.15E+00	pCi/g	103%

### **Control Sample Statistics**

Analyte	Ассигасу	Limits
Gross Alpha	126%	70-130%
Gross Beta	103%	70-130%



# **Enseco Mixed Waste Laboratory Radiochemistry Quality Control Report**

Parameter:

Gross Alpha and Beta

QC Lot:

28-Jul-93 -9A

QC Category: GAB-S

Matrix:

Soil

#### **Control Sample Report**

	Observed			Spike				
Sample	Activity	+/-	2σ	Activity	+/-	2σ_	Units	Accuracy
Alpha Standard	i 6.46E+03	+/-	4.70E+02	8.29E+03	+/-	2.63E+02	pCi/g	78%
Beta Standard	1.05E+04	+/-	3.10E+02	1.16E+04	<b>+/-</b>	1.32E+02	pCi/g	91%

#### **Control Sample Statistics**

Analyte	Accuracy	Limits
Gross Alpha	78%	70-130%
Gross Beta	91%	70-130%

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A

QC Run # 21-Jul-93 -9A

Units: ug/g Matrix: Aqueous

# **DUPLICATE CONTROL SAMPLE REPORT**

		Spike	
SAMPLE	Concentration	Concentration	Recovery
Control sample	1 2.09E+00 ug/g	2.00E+00 ug/g	104%
Control sample	2 2.20E+00 ug/g	2.00E+00 ug/g	110%

MEAN		PRECISION		
ACCURACY	LIMITS	RPD	LIMIT	
107%	80-120%	5%	20%	

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A QC Run # 21-Jul-93 -9A

Units: ug/L Matrix: Aqueous

## **BLANK REPORT**

SAMPLE	PLE Concentration Reporting Limit				
Blk 1	ND	1.0E+00 ug/L			
Blk 2	ND	1.0E+00 ug/L			

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A

QC Run # 21-Jul-93 -9B Units: ug/g Matrix: Soil

# **DUPLICATE CONTROL SAMPLE REPORT**

SAMPLE	Concentration	Spike Concentration	Recovery
•.	1 2.29E+00 ug/g	2.00E+00 ug/g	114%
	2 2.34E+00 ug/g	2.00E+00 ug/g	117%

MEAN		PRECISION	
ACCURACY	LIMITS	RPD	LIMIT
	80-120%	2%	20%

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A

QC Run # 21-Jul-93 -9B

Units: ug/g Matrix: Soil

# **BLANK REPORT**

SAMPLE	Concentration Reporting Limit				
Blk 1	ND	1.0E+00 ug/g			
Blk 2	ND	1.0E+00 ug/g			

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A QC Run # 22-Jul-93 -9A

Units: ug/g Matrix: Soil

## **DUPLICATE CONTROL SAMPLE REPORT**

		Spike		
SAMPLE	Concentration	Concentration	Recovery	
		و المام الما		
Control sample	1 2.17E+00 ug/g	2.00E+00 ug/g	109%	
Control sample	2 2.22E+00 ug/g	2.00E+00 ug/g	111%	

MEAN		PRECISION		
ACCURACY	LIMITS	RPD	LIMIT	
	80-120%	2%	20%	

Parameter: Total Uranium

QC Lot # .15-Jul-93 -9A QC Run # 22-Jul-93 -9A

Units: ug/g Matrix: Soil

## **BLANK REPORT**

SAMPLE	Concentration Reporting Limit				
Blk I	ND	1.0E+00 ug/g			
Blk 2	ND	1.0E+00 ug/g			

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A QC Run # 22-Jul-93 -9B

Units: ug/g

Matrix: Soil

## **DUPLICATE CONTROL SAMPLE REPORT**

		Spike	Spike	
SAMPLE	Concentration	Concentration	Recovery	
Control sample	1 2.00E+00 ug/g	2.00E+(X) ug/g	100%	
Control sample	2 2.12E+00 ug/g	2.00E+00 ug/g	106%	

'
LIMIT
20%

Parameter: Total Uranium

QC Lot # 15-Jul-93 -9A

QC Run # 22-Jul-93 -9B

Units: ug/g Matrix: Soil

## **BLANK REPORT**

SAMPLE	Concentration Rep	porting Limit	
Blk I	ND	1.0E+00 ug/g	
Blk 2	ND	1.0E+00 ug/g	



Chain-of-Custody Record

Date 7/1/13 - 1/2/93 Page [ of [

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STEPHEN K. STEPHEN TO Printed Name	Time	Banne	Mag	CY.			Time	areas that they brings.							(907) 272-7242 FAX (909) 272-7243		
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	Time				Time 5. Note all applicable preservatives.												
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Date 7/1/3 - 7/2/33 Page 1 of 1

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Chain-of-Custody Record

Date 7/1/93-7/2/93 Page / of /

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Date 7/1/93 - 7/2/93 Page / of /

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APPENDIX B
HAZARD RANKING SCORE SHEETS

Page: 1

OMB Approval Number: 2050-0095 Approved for Use Through: 1/92

			ID	ENTIF	CATIO	N
POTENTIAL HAZARDOUS			State:		CLIS No L22307!	
WASTE SITE		)	NPI	NM		
PRELIMINARY ASSESSMENT	FORM		CERCLIS	Disco	overy I	Date:
1. General Site Information						
Name: UNC San Mateo Mine		Street Addr 5.5 mi w o		teo or	n SR53	
City: San Mateo	State: NM	Zip Code: 87050	County McKinle		Co. Code:	
Latitude: Longitude: 35 19' 41.5" 107 43' 13.0"		Area of Site: 80 acres	Status   Inact:	of Si ive	te:	
2. Owner/Operator Information						
Owner: USDA Forest Service		Operator: Homestake M	ining Co	mpany		
Street Address: 517 Gold Avenue, SW		Street Addre	ss:			
City: Albuquerque		City:				
State: Zip Code: Telephone NM 87102 (505) 84		State: Zip	Code:	Telep	phone:	
Type of Ownership: Federal Agency		How Initiall Federal Pro		fied:		

Page: 2

				ID	ENTIFICAT	ON
POTENTIAL HAZA WASTE SITE	ARDOUS			State:	CERCLIS	
PRELIMINARY AS	SSESSMENT	FORM			Discovery 1983	Date:
3. Site Evaluator In	formation					
Name of Evaluator: Mike E. Brazie		Agency, SAIC	Organization	• .	Date Pre 11/29/	
Street Address: 14062 Denver West P	cwy, #200		City: Golden			State: CO
Name of EPA or State Allan Porter, USDA			Telephone: (505) 842-	3849		
Street Address: 517 Gold Ave., SW			City: Albuquerqu	e		State: NM
4. Site Disposition	(for EPA \	use only)				
Emergency Response/Removal Assessment	CERCLIS Recommen	ndation:	Signatu	re:		
Recommendation: No			Name:			
Date:	Date:		Position	n:		

Page: 3

				IDI	ENTIFICA	TION
POTENTIAL HAZARDOUS					L	S Number:
WASTE SITE	•					3075515
PRELIMINARY ASSESSMENT	FORM			CERCLIS	Discove	ry Date:
5. General Site Characteristic	 :s					
Predominant Land Uses Within  1 Mile of Site: Forest/Fields	Site Setti Rural	ing:		s of Open		.957
Agricultural Mining			Er	nding Year	r: 1	988
Type of Site Operations: Mining Metals				Generate Onsite	ed:	
Mecais				Deposition		orized
	·			Accessik	ole to t	he Public
			Schoo	ince to Ne ol, or Wor 3000 Feet	kplace:	
6. Waste Characteristics Infor	mation					
Source Type Quantity Pile 1.00e+05 Land treatment 1.00e+05	Tier G cu yds V sq ft A	Meta Radi	ls	ive Waste	ste:	
Tier Legend C = Constituent W = Wastest V = Volume A = Area		Physic Soli Slud	d	ate of Wa	aste as	Deposited

		IDENTIFICATION					
POTENTIAL HAZARDO WASTE SITE	State: CERCLIS Number: NM NM1223075515						
PRELIMINARY ASSES	PRELIMINARY ASSESSMENT FORM						
7. Ground Water Pathway							
Is Ground Water Used for Drinking Water Within 4 Miles: No	Is There a Suspected Release to Ground Water: No	List Secondary Target Population Served by Ground Water Withdrawn From:					
Type of Ground Water Wells Within 4 Miles: Private	Have Primary Target Drinking Water Wells Been Identified: No	0 - 1/4 Mile 0 >1/4 - 1/2 Mile 0 >1/2 - 1 Mile 0					
Depth to Shallowest Aquifer: 90 Feet Karst Terrain/Aquifer	Nearest Designated Wellhead Protection	>1 - 2 Miles 2 >2 - 3 Miles 0 >3 - 4 Miles 0					
Present: No	Area: None within 4 Miles	Total 2					

IDENTIFICATION POTENTIAL HAZARDOUS State: | CERCLIS Number: NM NM1223075515 WASTE SITE CERCLIS Discovery Date: PRELIMINARY ASSESSMENT FORM 1983 Part 1 of 4 8. Surface Water Pathway · • Shortest Overland Distance From Any Source to Surface Water: Type of Surface Water Draining Site and 15 Miles Downstream: Stream 2500 Feet 0.5 Miles Is there a Suspected Release to | Site is Located in: Surface Water: Yes | Annual - 10 yr floodplain Part 2 of 4 8. Surface Water Pathway Drinking Water Intakes Along the Surface Water Migration Path: No Have Primary Target Drinking Water Intakes Been Identified: No Secondary Target Drinking Water Intakes: None

Page: 6

# PA-Score 1.0 Scoresheets UNC San Mateo Mine - 12/07/93

IDENTIFICATION POTENTIAL HAZARDOUS State: | CERCLIS Number: | | NM1223075515 WASTE SITE CERCLIS Discovery Date: PRELIMINARY ASSESSMENT FORM 1983 Part 3 of 4 8. Surface Water Pathway Fisheries Located Along the Surface Water Migration Path: No Have Primary Target Fisheries Been Identified: No Secondary Target Fisheries: None Part 4 of 4 8. Surface Water Pathway Wetlands Located Along the Surface Water Migration Path? (y/n) No Have Primary Target Wetlands Been Identified? (y/n) No Secondary Target Wetlands: None Other Sensitive Environments Along the Surface Water Migration Path: Have Primary Target Sensitive Environments Been Identified: No Secondary Target Sensitive Environments: None

IDENTIFICATION POTENTIAL HAZARDOUS State: | CERCLIS Number: NM NM1223075515 WASTE SITE CERCLIS Discovery Date: PRELIMINARY ASSESSMENT FORM 1983 9. Soil Exposure Pathway Are People Occupying Residences or Number of Workers Onsite: None Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination: No Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination: No

10. Air Pathway

Total Population on or Onsite		Is There a Suspected Release to Air: No	
	0		
0 - 1/4 Mile	0	Wetlands Located	
>1/4 - 1/2 Mile	0	Within 4 Miles of the Site: No	
>1/2 - 1 Mile	0		
>1 - 2 Miles	2		
>2 - 3 Miles	0	Other Sensitive Environments Located	
>3 - 4 Miles	0 .	Within 4 Miles of the Site: No	
Total	2		

Sensitive Environments Within 1/2 Mile of the Site:

OMB opproval Number: 2050-0095 Approved for Use Through: 1/92

Site Name: UNC San Mateo Mine

CERCLIS ID No.: NM1223075515

Street Address: 5.5 mi w of San Mateo on SR53

City/State/Zip: San Mateo, NM 87050

Investigator: Mike E. Brazie

Agency/Organization: SAIC

Street Address: 14062 Denver West Pkwy, #200

City/State: Golden, CO

Date: 11/29/93

Page: 1

WASTE CHARACTERISTICS

Waste Characteristics	(WC) Calculations:				
1 Waste Piles	Pile	Ref:	1	WQ value	maximum
Volume	1.00E+05 cu yds			4.00E+04	4.00E+04
2 Leach Pad	Land treatment	Ref:	1	WQ value	maximum
Area	1.00E+05 sq ft			3.70E+02	3.70E+02

WQ total 4.04E+04

| Waste Characteristics Score: WC = 100

Ground Water Pathway Criteria List Suspected Release	
Are sources poorly contained? (y/n/u)	Y
Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)? (y/n/u)	Y
Is waste quantity particularly large? (y/n/u)	Y
Is precipitation heavy? (y/n/u)	N
Is the infiltration rate high? (y/n/u)	N
Is the site located in an area of karst terrain? $(y/n)$	N
Is the subsurface highly permeable or conductive? $(y/n/u)$	N
Is drinking water drawn from a shallow aquifer? (y/n/u)	Y
Are suspected contaminants highly mobile in ground water? $(y/n/u)$	N .
Does analytical or circumstantial evidence suggest ground water contamination? (y/n/u)	<b>N</b> :
Other criteria? (y/n) Y	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Page: 3

Ground Water Pathway Criteria List Primary Targets

Is any drinking water well nearby? (y/n/u)

Has any nearby drinking water well been closed? (y/n/u)

Has any nearby drinking water well user reported foul-testing or foul-smelling water? (y/n/u)

Does any nearby well have a large drawdown/high production rate? (y/n/u)

Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance? (y/n/u)

Does analytical or circumstantial evidence suggest contamination at a drinking water well? (y/n/u)

Does any drinking water well warrant sampling? (y/n/u)

Other criteria? (y/n)

PRIMARY TARGET(S) IDENTIFIED? (y/n)

Summarize the rationale for Primary Targets:

Page: 4

## GROUND WATER PATHWAY SCORESHEETS

thway Characteristics		_	· 	Ref	
Do you suspect a release? (y/n) No					
Is the site located in karst te	No				
Depth to aquifer (feet):	9(	90			
Distance to the nearest drinkin	ng water well	(feet): 80	000	1	
LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	Reference		
1. SUSPECTED RELEASE	0				
2. NO SUSPECTED RELEASE		340			
LR =	0	340			
gets					
TARGETS	Suspected Release	No Suspected Release	Refe	rence	
3. PRIMARY TARGET POPULATION 0 person(s)	0				
4. SECONDARY TARGET POPULATION Are any wells part of a blended system? (y/n) N	0	1			
5. NEAREST WELL	0	5			
6. WELLHEAD PROTECTION AREA None within 4 Miles	0	0			
7. RESOURCES	. 0	5			
T =	0	11			
- STE CHARACTERISTICS -				. = - = = =	
WC =	0	100	_    -		
<u>-</u>			-		
OUND WATER PATHWAY SCORE:		5			

Ground Water Target Populations

Primary Target Population Drinking Water Well ID	Dist. (miles)	Population Served	Reference	Value
None				
			· 	
			Total	

Total | 1

UNC San Mateo Mine - 12/01/93

Apportionment Documentation for a Blended System

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Surface Water Pathway Criteria List Suspected Release	
Is surface water nearby? (y/n/u)	Y
Is waste quantity particularly large? (y/n/u)	Y
Is the drainage area large? (y/n/u)	N
Is rainfall heavy? (y/n/u)	N
Is the infiltration rate low? (y/n/u)	Y
Are sources poorly contained or prone to runoff or flooding? (y/n/u)	Y
Is a runoff route well defined(e.g.ditch/channel to surf.water)? (y/n/u)	Y
Is vegetation stressed along the probable runoff path? (y/n/u)	<b>Y</b> 1
Are sediments or water unnaturally discolored? (y/n/u)	<b>Y</b> '
Is wildlife unnaturally absent? (y/n/u)	N
Has deposition of waste into surface water been observed? (y/n/u)	Y
Is ground water discharge to surface water likely? (y/n/u)	N
Does analytical/circumstantial evidence suggest S.W. contam? (y/n/u)	Y
Other criteria? (y/n) Y	
SUSPECTED RELEASE? (y/n)	Y

#### Summarize the rationale for Suspected Release:

Based on visual observation, tailings are eroding from the waste piles into the arroyos which drain into San Mateo Creek. Sediment samples from these areas showed elevated concentrations of radioactive elements.

Surface Water Pathway Criteria List Primary Targets					
Is any target nearby? (y/n/u) If yes:  N Drinking water intake N Fishery U Sensitive environment	N				
Has any intake, fishery, or recreational area been closed? (y/n/u)	N				
Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target? (y/n/u)	N				
Does any target warrant sampling? (y/n/u) If yes:  N Drinking water intake N Fishery U Sensitive environment	N				
Other criteria? (y/n) N					
PRIMARY INTAKE(S) IDENTIFIED? (y/n)  Summarize the rationale for Primary Intakes:	N				

continued -----

continued				
Other criteria? (y/n)	N			
	PRIMARY FISHERY(IES)	IDENTIFIED?	(y/n)	N
Summarize the rationale for	Primary Fisheries:			
			·	
		~~~~~~		
Other criteria? (y/n)	N			
PRIMARY SE	NSITIVE ENVIRONMENT(S)	IDENTIFIED?	(y/n)	N
Summarize the rationale for	Primary Sensitive Env	ironments:		

Page: 10

#### SURFACE WATER PATHWAY SCORESHEETS

Pathway Characteristics				Ref.		
Do you suspect a release? (y/	n)	Y	es			
Distance to surface water (fe	Distance to surface water (feet): 2500					
Flood frequency (years):						
a. the nearest dring b. the nearest fish	What is the downstream distance (miles) to:  a. the nearest drinking water intake?  b. the nearest fishery?  c. the nearest sensitive environment?  0.0					
LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	Refer	ences		
1. SUSPECTED RELEASE	550					
2. NO SUSPECTED RELEASE		0				
LR =	550	0				

Page: 11

#### Drinking Water Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
3. Determine the water body type, flow (if applicable), and number of people served by each drinking water intake.			
4. PRIMARY TARGET POPULATION 0 person(s)	0		
5. SECONDARY TARGET POPULATION Are any intakes part of a blended system? (y/n): N	0	0	
6. NEAREST INTAKE	0	0	
7. RESOURCES	5	0	
T =	5	0	

#### Drinking Water Threat Target Populations

Intake Name	Primary (y/n)	Water	Body	Type/Flow	Population Served	Ref.	Value
None							
			_				
	l			· · · · · · · · · · · · · · · · · · ·			
Total Primary Target Population Value Total Secondary Target Population Value						0	

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Page: 13

#### Human Food Chain Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
8. Determine the water body type and flow for each fishery within the target limit.			
9. PRIMARY FISHERIES	0		
10. SECONDARY FISHERIES	0	0	'
T = 1	0	0	

#### Human Food Chain Threat Targets

Fishery Name	Primary (y/n) Water Body Type/Flow	Ref.	Value
None			
	Total Primary Fisheries Value Total Secondary Fisheries Va		0

Page: 14

#### Environmental Threat Targets

	TARGETS	Suspected Release	No Suspected Release	References
	<pre>11. Determine the water body type   and flow (if applicable)   for each sensitive   environment.</pre>			
	12. PRIMARY SENSITIVE ENVIRONMENTS	0		
	13. SECONDARY SENSITIVE ENVIRONS.	0	0	ļ
_	T =	O	0	i

#### Environmental Threat Targets

Sensitive Environment	Primary (y/n)	Water Body	Type/Flow	Ref.	Value
None					
				<u> </u>	
		!			
		ļ			
Total Primary Sensitive Environments Value Total Secondary Sensitive Environments Value					0

Page: 15

#### Surface Water Pathway Threat Scores

Threat	Likelihood of Release(LR) Score		Pathway Waste Characteristics (WC) Score	Threat Score LR x T x WC / 82,500
Drinking Water	550	5	100	3
Human Food Chain	550	0	100	0
Environmental	550	0	100	0

SURFACE	WATER	PATHWAY	SCORE:	1	3

}

7

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Soil Exposure Pathway Criteria List Resident Population	
Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? (y/n/u)	N
Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? (y/n/u)	N
Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? (y/n/u)	N
Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? (y/n/u)	N
Does any neighboring property warrant sampling? (y/n/u)	N
Other criteria? (y/n) N	
RESIDENT POPULATION IDENTIFIED? (y/n)	N

Summarize the rationale for Resident Population:

Page: 17

#### SOIL EXPOSURE PATHWAY SCORESHEETS

Pathway Characteristics				Ref.
Do any people live on or within of areas of suspected contamin			No	
Do any people attend school or of areas of suspected contamin	daycare on or w	vithin 200 ft	No	
Is the facility active? (y/n):	<b>.</b>		No	
LIKELIHOOD OF EXPOSURE	Suspected Contamination	References	·	
1. SUSPECTED CONTAMINATION LE =	550			
Targets				
2. RESIDENT POPULATION 0 resident(s) 0 school/daycare student(s)	0			
3. RESIDENT INDIVIDUAL	0			
4. WORKERS None	0			
5. TERRES. SENSITIVE ENVIRONMENTS	0			
6. RESOURCES	5			
T =	5			
WASTE CHARACTERISTICS		_		
WC =	100	-		
		_		
RESIDENT POPULATION THREAT SCORE:	3	-		
NEARBY POPULATION THREAT SCORE:	0	<u>-</u>		
Population Within 1 Mile: None				
SOIL EXPOSURE PATHWAY SCORE:	3	<u>-</u> 		
•		•		

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Soil Exposure Pathway Terrestrial Sensitive Environments

Terrestrial Sensitive Environment Name	Reference	Valu
None		
	<b>i</b>	
Total Terrestrial Sensitive Environ	ments Value	

Page: 19

Air Pathway Criteria List Suspected Release	
Are odors currently reported? (y/n/u)	N
Has release of a hazardous substance to the air been directly observed? (y/n/u)	N
Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air? (y/n/u)	N
Does analytical/circumstantial evidence suggest release to air? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

#### Summarize the rationale for Suspected Release:

Mine waste is exposed (uncovered and unvegetated) and dry. Waste materials have eroded from the pile and into the ephemeral stream adjacent to the waste pile, and have the potential to be eroded and redeposited by wind. However, air samples collected at the site did not contain detectable concentrations of contaminants.

Ref: 5

Page: 20

#### AIR PATHWAY SCORESHEETS

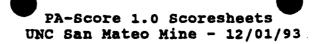
Pathway Characteristics			Ref.
Do you suspect a release? (y/	n)	No	o
Distance to the nearest indiv	vidual (feet):	80	000   1
LIKELIHOOD OF RELEASE	Suspected   Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	
Targets			
TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION	0	0	
5. NEAREST INDIVIDUAL	0	0	
6. PRIMARY SENSITIVE ENVIRONS.	0		
7. SECONDARY SENSITIVE ENVIRONS	0	0	
8. RESOURCES	0	5	
T =	•   0	5	
JACTE GUADAGTEDTOTOS			
WASTE CHARACTERISTICS WC =	:   0	100	<u> </u>
			•
			-

AIR PATHWAY SCORE:

PA-Score 1.0 Scoresheets
UNC San Mateo Mine - 12/01/93

#### Air Pathway Secondary Target Populations

Distance Categories	Population	References	Value
Onsite	0		0
Greater than 0 to 1/4 mile	0		0
Greater than 1/4 to 1/2 mile	0		0
Greater than 1/2 to 1 mile	0		0
Greater than 1 to 2 miles	2		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	0		0
	Total Secondary Popula	ation Value	0



Air Pathway Primary Sensitive Environments

	-			
	Sensitive Environment Name		Reference	Value
	None			
	Total Primary Sensitive	Environmen	ts Value	
Air P	athway Secondary Sensitive Environments			
	Sensitive Environment Name	Distance	Reference	Value
1	None			
	Total Secondary Sensitiv	e Environme	ents Value	

## PA-Score 1.0 Scoresheets UNC San Mateo Mine - 12/01/93

SITE SCORE CALCULATION	SCORE
GROUND WATER PATHWAY SCORE:	5
SURFACE WATER PATHWAY SCORE:	3
SOIL EXPOSURE PATHWAY SCORE:	3
AIR PATHWAY SCORE:	3
SITE SCORE:	4

#### SUMMARY

1.	Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water?	no No
	If yes, identify the well(s).	
	at job, identify the well(b).	
	$\cdot$	
	If wes, how many people are served by the threatened well(s)? 0	
	If yes, how many people are served by the threatened well(s)? 0	
2.	Is there a high possibility of a threat to any of the following by	ļ
	hazardous substance migration in surface water?	
	A. Drinking water intake	No
	B. Fishery	No
	C. Sensitive environment (wetland, critical habitat, others)	No
	If yes, identity the target(s).	{
	if yes, identity the target(s).	
		Ł
		İ
3.	Is there a high possibility of an area of surficial contamination	
	within 200 feet of any residence, school, or daycare facility?	No
	If yes, identify the properties and estimate the associated populat	cion(s)
4.	Are there public health concerns at this site	
	that are not addressed by PA scoring considerations?	No
	If yes, explain:	

#### REFERENCE LIST

- "Site Investigation, Federal Facility Compliance Program, San Mateo Uranium Mine, Mt. Taylor Ranger District, Cibola National Forest, McKinley County, New Mexico", May 30, 1989.
- 2. U.S. Geological Survey, 7.5-minute topographic quandrangle map of New Mexico; San mateo, 1963, photo revised 1981.
- 3. U.S. EPA, "Standard Operating Procedure to Determine Site Latitude and Longitude Coordinates", 1991, calculation worksheet for San Mateo Uranium Mine.
- 4. "UNC San Mateo Mine Preliminary Assessment", New Mexico Environmental Improvement Division, June 30, 1988.
- 5. (Site Inspection Report)



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

**REGION 6** 1445 ROSS AVENUE: SUITE 1200 DALLAS, TX 75202-2733

January 10, 1996

Ms. Maura Hanning Program Manager, Superfund Section New Mexico Environment Department Harold Runnels Building P.O. Box 26110 Santa Fe, NM 87502

Dear Ms. Hanning:

Enclosed for your information and file is a list of sites that have been reviewed by the EPA. Included with the list are the Superfund Site Strategy Recommendations (SSSRs) and copies of the reports for each site.

Please note that all sites receiving a designation of No Further Response Action Planned (NFRAP) under Superfund will be removed from the active Comprehensive Environmental Response Compensation and Liability Information Systems (CERCLIS) database. These sites are referred to the State Agency for any action, if appropriate, under the State's regulatory framework.

Site Name UNC San Marcos Mine MM122307515

Recommendation

NFRAP

Should you have any questions, please contact me at (214) 665-6740.

Sincerely yours,

Eddie Sierra, Team Leader Site Assessment Team

Enclosure



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## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY SUPERFUND SITE STRATEGY RECOMMENDATION - REGION 06



Site Name: UNC-San Mateo Mine	CERCLIS ID#: NM12230755#5
Alias Site Names:	
Address: 5.5 miles W of San Mateo	
City/County or Parish/State/Zip Code: San Mateo/Cibola/New I	Mexico
Report Type, Date, and Author: SIP II/Nov. 1995/Weston	
RECOMMENDATION	
$\mathbf{O}$	· · · · · · · · · · · · · · · · · · ·
() 3. Action Deferred to: () RCRA () NRC	
NOTIFY AUTHORITY:	
() Removal () RCRA () TSCA () Remedial (X) State () NPDES () CERCLA Enforcement () Federal Facility () UIC SEND COPIES TO: () 6E-E () 6W-SP ()	( ) CAA ( ) SMCRA ( ) NRC ( ) Resource Trustee: ( ) SPCC ( ) Other:  ATSDR ( ) State Agency
DISCUSSION:	
miles west of the town of San Mateo. The site is an inactive of tailings pile and a heap leach pile. The waste sources are unresponding in the adjacent arroyo and possibly San Mateo Creek scored 1.93. Since the site scored below 28.5, a determination has been referred to the State for appropriate action under the	Mateo site, located in the Cibola National Forest, approximately 5.5 granium mine. Two primary waste sources at the site are a mine claimed, have no cover and are reportedly eroding with redeposition. Due to the lack of targets within the exposure pathways, the site in of no further remedial action is planned under CERCLA. This site is applicable regulations.
APPROVALS:	
Disposition Recommended by: <u>LaDonna Walker</u> S (Site Assessment Manager)	ignature: <u>Hallonna Walker</u> Date: <u>Dec/07/95</u>
Disposition Recommended by: Ragan Broyles S (Section Chief)	gnature: Lina for Abruyles Date: 12/07/96  gnature: Clina for Chazda Date: 12/09/95
Disposition Approved by: <u>Charles A. Gazda S</u> (Branch Chief)	gnature: Chiria fn Chazda Date: 12/07/95

# PHASE II SITE INSPECTION PRIORITIZATION REPORT AND PRESCORE PACKAGE UNC-SAN MATEO MINE SAN MATEO, CIBOLA COUNTY, NEW MEXICO EPA ID NO.: NM12230755 5

#### Prepared for:

U.S. Environmental Protection Agency Region VI 1445 Ross Avenue, Suite 1200 Dallas, Texas 75202-2733

Contract No.: 68-W9-0015 Work Assignment No.: 54-6JZZ Document Control No.: 4606-54-0113

#### Submitted by:

Roy F. Weston, Inc. 70 N.E. Loop 410, Suite 460 San Antonio, Texas 78216 (210) 342-7810

Prepared by:

Peter Rung/Robert B. Beck, P.E.

November 1995

#### INTRODUCTION

Roy F. Weston, Inc. (WESTON<sub>\*</sub>) is pleased to present this report which summarizes the results of the file review completed for the UNC-San Mateo Mine (San Mateo) site (NM1223075575), located near San Mateo, Cibola County, New Mexico. WESTON was tasked by the U.S. Environmental Protection Agency (EPA) Region VI under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to review existing file information and gather additional information to accurately evaluate the San Mateo site as part of the Site Inspection Prioritization (SIP) Work Assignment for various sites in EPA Region VI.

EPA established the SIP process to help assess known or potential hazardous waste sites. The SIP addresses first those sites that pose the greatest threat to human health and the environment and standardizes the criteria by which sites are evaluated within the Superfund program. Through the SIP, the EPA reviews sites that generally have had a complete Site Inspection (SI) performed on them but that have not received a final decision regarding the need for further investigation or remediation. The outcome of the SIP indicates whether the available information for the site meets a minimum standard of evaluation reflecting the requirements of the revised Hazard Ranking System (HRS). The SIP process better enables the EPA to determine if a site is likely to receive a score of 28.5 or above under the HRS, potentially making it a candidate for placement on the National Priorities List (NPL). If it is determined that the site will not score above the NPL threshold of 28.5, the EPA is in a position to declare No Further Remedial Action Planned (NFRAP) status for the site.

#### SITE BACKGROUND INFORMATION

The San Mateo site is located in the Cibola National Forest, approximately 5.5 miles west of the town of San Mateo, Cibola County, New Mexico. The 80-acre facility is an inactive uranium mine. Notable site features included a headframe/hoist/ore bin structure, warehouse/office building, machine shop/power plant building, mine waste dump, settling ponds, and access roads. Operations at the site began in 1957 under the Rare Metals Corporation and continued until 1962 when El Paso Natural Gas Corporation assumed ownership. UNC bought the site in 1964 and ran operations independently and with various partners until 1979 when Homestake Mining purchased UNC's share of the mine. In 1984, Homestake Mining notified the USDA Forest Service of its intent to abandon all claims and cease all operations in the Cibola National Forest. The main shaft and the emergency shaft to the San Mateo mine were sealed. A Site Location Map and Site Area Map are provided as Figures 1 and 2 in Attachment 1.

Waste rock from the operation was deposited around the mine head in a series of tailings piles. Ore was not milled at the site, but a heap leach pad was constructed onsite. Specific processes and chemicals used in the leaching operation are unknown. The heap leach pile contains an estimated 13,000 cubic yards of waste material.

Roberta Baca of the U.S. Forest Service in Albuquerque, New Mexico, stated that the Principally Responsible Parties (PRP's) have been contacted and asked to complete a cost assessment for the clean-up of the site.

Previous investigations at the San Mateo site include the following:

- A study and sampling mission was conducted by the New Mexico Environmental Improvements Division (NMEID) in February 1986. Analysis of sediments at the site revealed elevated concentrations of arsenic, lead, molybdenum, selenium, uranium, and vanadium, as well as elevated gross alpha and beta particle activities.
- A Preliminary Assessment (PA) was conducted on 30 June 1988 by NMEID. The report stated that the tailings pile and the heap leach area were actively eroding with redeposition occurring in the adjacent arroyo and possibly San Mateo Creek.
- A Site Inspection (SI) was conducted by Science Applications International Corporation (SAIC) in January 1994. Surface water, soil, and air samples were taken at the site and groundwater samples were collected from nearby wells. The SI states that radioactive contamination is present at the site and that a surface release of these contaminants has apparently occurred.

Based on these site investigations, soil contamination and the subsequent erosion and movement off-site of these contaminated materials appears to be the primary concern at the site.

#### **Data Collected During the Phase II SIP**

Additional site information resulting from Phase II SIP information gathering efforts is described below.

#### Identification and Location of Water Wells

According to Roy Cruz of the U.S. Geological Survey (USGS) in Albuquerque, New Mexico, no water wells were identified within a 1-mile radius of the San Mateo site. Three water wells outside of a 1-mile radius were located and sampled during the 1994 SAIC SI. The closest well is located approximately 1.6 miles northwest of the site at the Marcus Ranch. The well is reportedly drilled to a depth of 210 feet below ground surface (bgs). The next closest well, located at the Lee Ranch, is approximately 2.1 miles east of the site and is drilled to a depth of 37 feet bgs. A third well is located at the Red Rock Ranch approximately 2.8 miles northwest of the site. The depth of the well is unknown. The water from the well at the Red Rock Ranch was shown to exceed Maximum Contaminant Levels (MCLs) for selenium and gross alpha activity. However, the well is located in an ore-bearing geologic province where associated radionuclides and metals found in the bedrock could be affecting water quality. Therefore, the contaminants identified in the well may not be directly attributed to site-related activities. No contaminants were found in the other wells.

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#### Description of the Surface Water Pathway

Drainage from the site enters an unnamed intermittent arroyo that borders the site and flows north approximately 3000 feet before discharging to San Mateo Creek. San Mateo Creek flows west-southwest for the remaining 14.4 miles of the 15-mile Target Distance Limit (TDL). The creek is shown to be perennial for a short distance on the USGS San Mateo, New Mexico 7.5 minute topographic map. Mean average rainfall in the area is less than 20 inches a year, therefore, intermittently flowing waters are eligible for inclusion within the 15-mile surface water pathway TDL. The probable point of entry (PPE) is located at the point where run-off from the site enters the unnamed intermittent arroyo. A Surface Water Pathway Map is provided as Figure 3 in Attachment 1.

#### Identification of Surface Water Intakes

No public supply surface water intakes were identified along the surface water pathway. However, the Marcus ranch is reported to use surface water, as well as groundwater, for domestic and stock purposes. The ranch is located along San Mateo Creek approximately 2.5 miles downstream of the PPE.

#### Site Accessibility

The 1988 PA Report by NMEID stated that the present site fence was in poor condition and ineffective in restricting access to the site.

#### Determination of Nearby Population

During the Phase II SIP effort, WESTON determined the population within target distances by using the EPA Geographical Exposure Modeling System (GEMS) Population Database and EPA Region VI file information. The population within a 4-mile radius of the site was determined to be approximately 9 people. The population distribution is summarized in the following table.

DISTANCE (miles)	POPULATION
0 to ½	0
¼ to ½	0
½ to 1	0
1 to 2	3
2 to 3	6
3 to 4	0

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#### **HRS SCORING**

Using the information provided from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) files maintained by EPA Region VI and the additional data collected during the Phase II SIP, WESTON developed a Hazard Ranking System (HRS) score for the site using PREscore. The PREscore is included as Attachment 2. The site received an HRS score of 1.93 based on the waste characteristics and migration pathway scoring factors discussed in the following paragraphs.

#### SOURCE WASTE CHARACTERISTICS

The site contains two apparent sources of potentially CERCLA-eligible hazardous substances. These sources include:

- A mine tailings pile (i.e. waste pile)
- A heap leach pile (i.e. waste pile)

The tailings pile consists of waste rock from the mining operation deposited around the mine head. The pile is estimated to have a volume of 100,000 cubic yards. The tailings are unreclaimed, have no vegetative cover, and are reportedly actively eroding with redeposition occurring in the nearby unnamed arroyo. Due to the relatively high radioactive levels measured during the 1994 SAIC SI site screening (2300 pCi/g Uranium), direct samples of the tailings pile were not collected. However, analysis of soil samples taken in the general vicinity of the piles revealed elevated concentrations of arsenic, barium, lead, radium 226, selenium, uranium, and vanadium as well as elevated gross alpha and beta activities.

The heap leach pile is located in the northeastern side of the site and consists of an area where ore was leached from waste rock. The specific chemicals and processes used in the leaching operation are unknown. The area is reported to have a total area of 100,000 square feet. It is unreclaimed, has no vegetative cover, and is reportedly actively eroding with redeposition occurring in the nearby unnamed arroyo. Analysis of tailings samples collected at the piles during the 1994 SAIC SI revealed elevated concentrations of arsenic, barium, lead, radium 226, selenium, uranium, vanadium, as well as elevated gross alpha and beta activities.

#### MIGRATION AND EXPOSURE PATHWAYS

#### Groundwater Pathway

The groundwater pathway received a pathway score of 1.61. Three groundwater wells were sampled during the 1994 SAIC SI. The nearest well is located approximately 1.6 miles northwest of the site at the Marcus Ranch. Analysis of the samples from the Red Rock Ranch well located approximately 2.8 miles northwest of the site revealed concentrations exceeding the MCLs for selenium and gross alpha activity. However, the contamination could not be directly attributed to the site due to the location of the well within an ore-bearing geologic province.

Also, there is no on-site groundwater data available. Therefore a site-related release to groundwater has not been documented.

#### Surface Water Pathway

The surface water pathway received a pathway score of 3.33. Runoff from the site drains into an unnamed arroyo located on the eastern border of the site. The location that site runoff enters the intermittent arroyo is considered the PPE. Sediment samples collected in the arroyo near the site during the 1994 SAIC SI reveal elevated concentrations of selenium, uranium, radium 226, and gross alpha and beta activities and indicate a release to the surface water pathway. The tailings pile and the heap leach pile are unreclaimed, have no vegetative cover, and are reportedly actively eroding. However, no surface water intakes, fisheries, wetlands, or other sensitive environments have been identified in the area of the site, although surface water may provide stock water to the some of the ranches in the area. Therefore, a release to surface water was scored, but the pathway score was low due to a lack of targets.

#### Soil Exposure Pathway

The soil exposure pathway received a pathway score of 1.07. According to the 1994 SAIC SI, analysis of soil samples at the site revealed radioactivity contaminated soils over a broad area of the site. However, the pathway score is low due to a lack of targets. The site is located in a rural area of the Cibola National Forest. The operation is inactive and there is no resident population. There is no identified population within a 1-mile radius of the site. The nearest significant population center is the town of San Mateo located 5.5 miles east of the site. No sensitive environments have been identified. The site is accessible, however, due to its remote nature, few people are believed to enter the site. Cattle graze the area and have access to the mine site.

#### Air Pathway

The air pathway received a score of 0. Air sampling conducted during the 1994 SI did not reveal any airborne contaminants. However, the tailings pile and heap leach pile are susceptible to wind erosion due to the unreclaimed nature of the source waste areas, and a release to air could be occurring. This pathway score is low because a release was not scored and there are few targets.

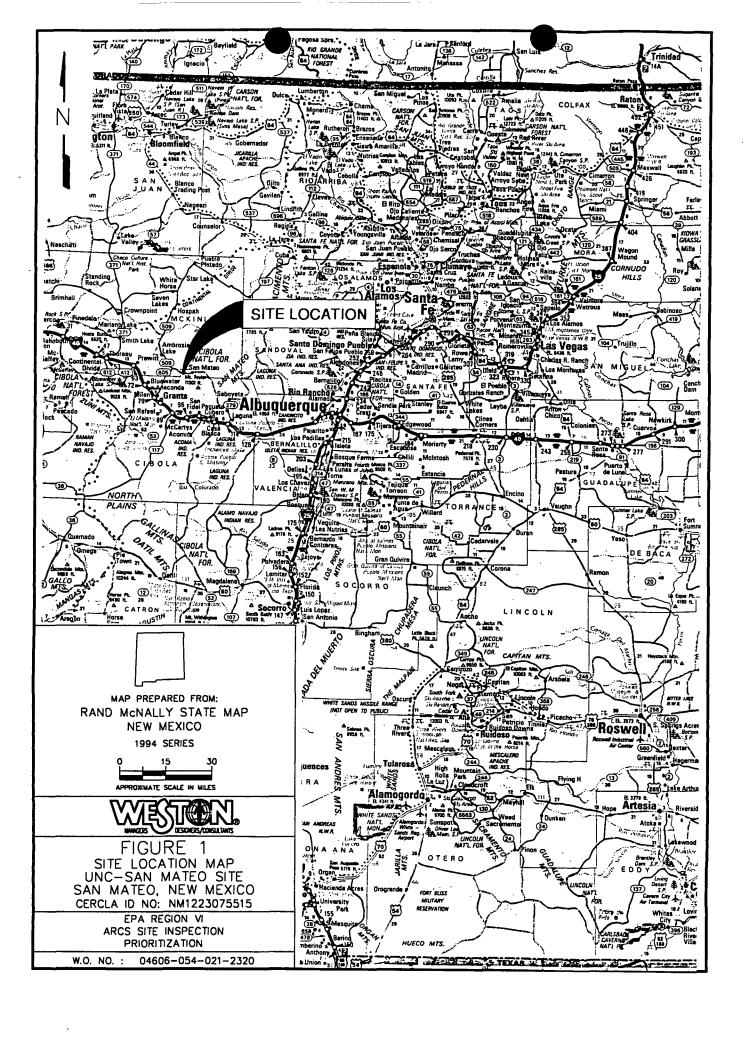
#### **CONCLUSIONS**

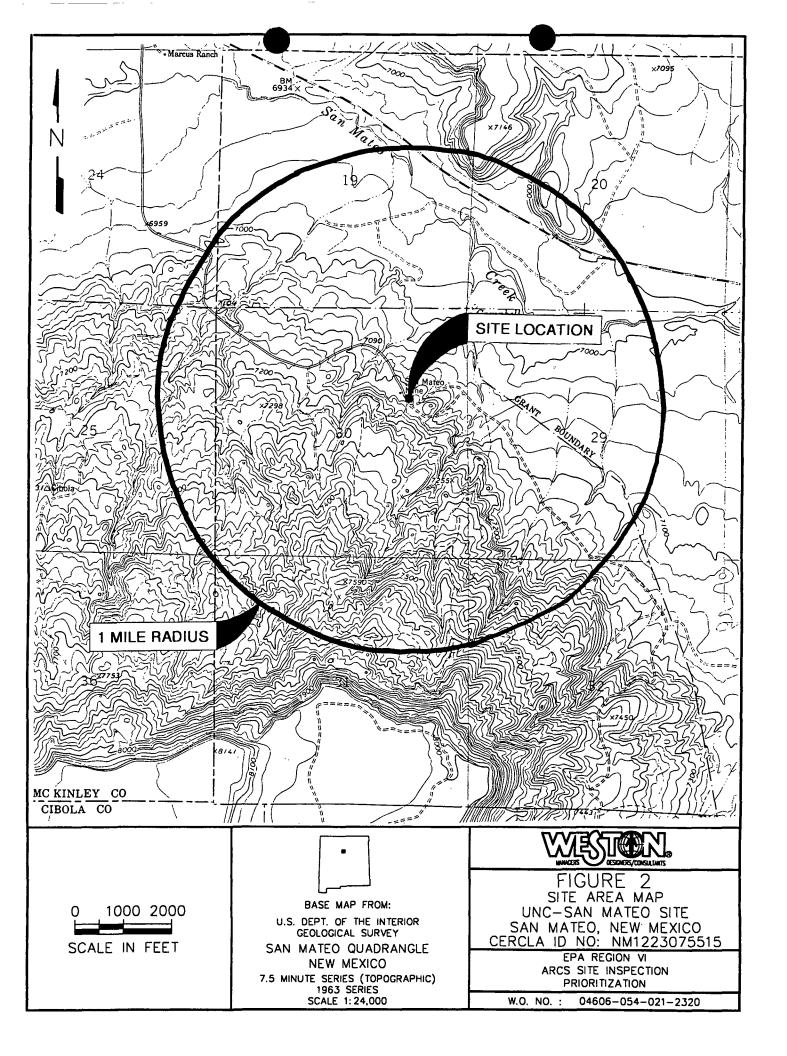
The San Mateo site, located in the Cibola National Forest, approximately 5.5 miles west of the town of San Mateo, is an inactive uranium mine. The overall PREscore for the site is 1.93. Analysis of samples from the 1994 SAIC SI revealed radioactive and metals contamination over a large area of the site. The two primary waste sources at the site are a mine tailings pile and a heap leach pile. The waste sources are unreclaimed, have no cover, and are reportedly actively eroding with redeposition occurring in the adjacent arroyo and possibly San Mateo Creek. The surface water pathway scored highest based on analytical evidence supporting a

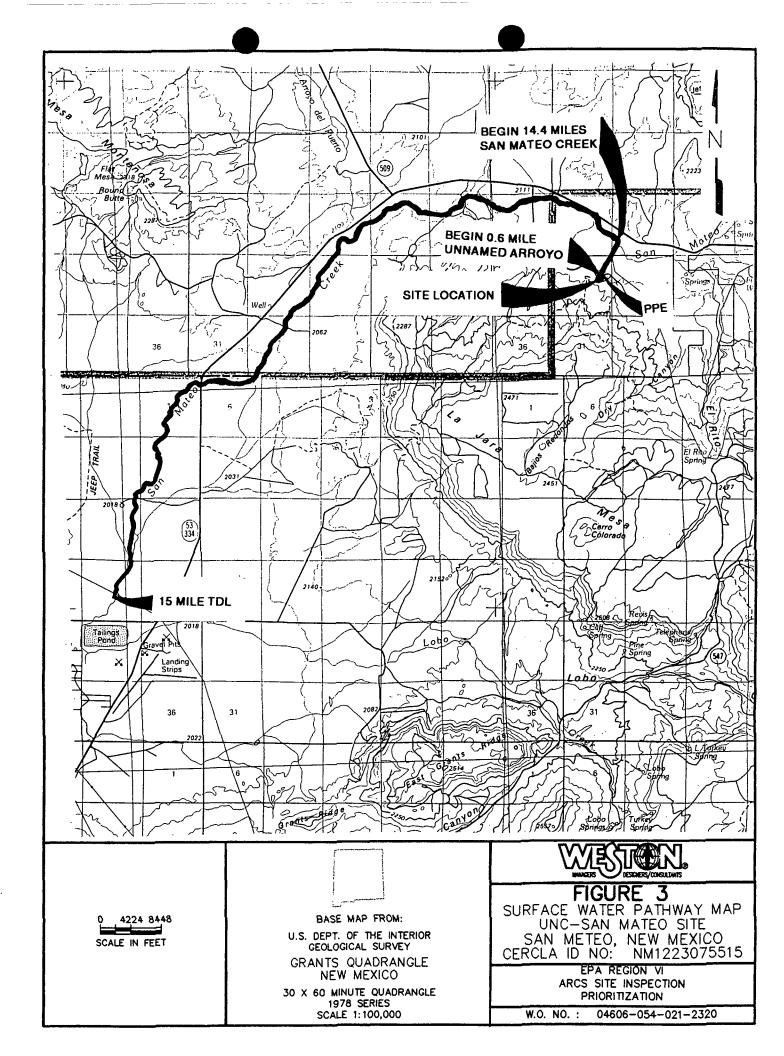
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release of hazardous constituents to this pathway. However, the overall site score was relatively low due to a lack of targets within the exposure pathways.

ATTACHMENT 1







**ATTACHMENT 2**